Ontario Task Force
on Health and Safety
in Agriculture

Groupe d'étude de l'Ontario
sur la santé et la sécurité
dans l'agriculture

Report of the Ontario Task Force on Health and Safety in Agriculture

A joint project of the Ministries
of Agriculture and Food and Labour

Un projet commun du Ministère

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REPORT

OF

ONTARIO TASK FORCE

ON HEALTH AND SAFETY

IN AGRICULTURE

Toronto, Ontario

October 29, 1985

Ontario Task Force on Health and Safety in Agriculture

Groupe d'étude de l'Ontario sur la santé et la sécurité dans l'agriculture

A joint project of the Ministries of Agriculture and Food and Labour /
Un projet commun du Ministère de l'Agriculture et l'Alimentation et du Ministère du Travail

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October 29, 1985

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Minister of Agriculture and Food
Legislative Buildings, Queen's Park
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The Honourable William Wrye
Minister of Labour
400 University Avenue
Toronto, Ontario
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Dear Sirs:

We are pleased to transmit to you the report of the Ontario Task Force on Health and Safety in Agriculture. We were instructed to investigate and report on the need for protection of health and safety of farmers, farm workers and members of farm families. We have attempted to accomplish this task.

Ron Cameron.

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Thamesville, Ontario

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SUMMARY OF RECOMMENDATIONS

Chapter One

1. that an agency be established jointly by the Ministries of Agriculture and Food and of Labour that has comprehensive responsibility for developing and administering health and safety programs in agriculture. (p.33)

Chapter Two

2. that the approach to fatality data collection already in place be extended to make consistent use of all available sources, for example, the files of the Registrar General and of the Office of the Chief Coroner. (p.42)

3. that rigorous criteria be established for what fatalities are reported as farm fatalities and that they be classified, perhaps as set out in Appendix 2, with respect to the directness of their relationship to farm work. (p.42)

4. that every effort be made to maintain a consistent relationship between the fatality data and farm employment and population statistics produced by Statistics Canada. (p.42)

5. that the case-by-case description format of the Farm Safety Association's annual report on farm fatalities be retained and that greater public use be made of the report and background information to it as vehicles for accident prevention. (p.42)

6. that survey work be undertaken among farmers, farm family workers and hired farm workers to:

   - describe their work injury and illness experience;

   - describe the occurence and nature of health and safety hazards in farm work and the extent of exposure to them;

   - relate the injury and illness experience and exposure information to variables that describe the characteristics of farm work, farm workers and their working conditions; and,

   - wherever possible, ensure that the survey information is collected and analysed in ways that permit it to be used in conjunction with existing data sources. (p.46)

7. that the agencies currently generating information on farm health and safety experience and those preparing statistics from that information work together to ensure that they use consistent definitions and systems of classification and that their output is compatable with other major statistical series, such as farm employment data prepared by Statistics Canada. (p.47)

8. that a health data collection system using existing data generating sources, such as the Hospital Medical Records Institute, Ontario

Hospital Insurance Plan, Poison Control Centres, Workers' Compensation Board, Ontario Ministry of Health and perhaps others, be established to record and analyse adverse health effects experienced by farmers and farm workers. (p.48)

9. that the Agency, in cooperation with the Ministries of Labour and of Agriculture and Food, put a high priority on developing an information base that will permit meaningful analysis of farm occupational health and safety issues. (p.54)

Chapter Three

10. that approved roll-over protective structures (ROPS) and seat belts be made mandatory on all new tractors used in farming from the earliest date such legislation can be put in place and that only essential exceptions to these requirements be worked out by the Agency responsible for health and safety in agriculture with representatives of the industry. (p.62)

11. that a government funded program be developed to assist farmers with the cost of installing ROPS on tractors they now own and that are not so equipped; that manufacturer approved ROPS or designs tested and certified by the Canadian Standards Association be used for this purpose; and that the retrofitting program be completed by a date to be specified in legislation. (p.62)

12. that interlocking safety cut-off switches be mandatory on farm tractors and other self-propelled farm equipment offered for sale in Ontario after a date to be specified in legislation. (p.64)

13 that an emergency power take-off (PTO) shut-off switch be so located on new farm tractors as to lend itself to being easily reached in emergency situations, and that farmers be encouraged to install such shut-off switches wherever it is practical to do so on existing equipment. (p.64)

14. that automatic beepers, appropriate to the machine in question, be made mandatory on all new self-propelled farm equipment purchased after a date to be specified in legislation and that farmers be encouraged to equip machinery already in use with similar devices. (p.65)

15. that the Agency, or the organization selected under Recommendation 22, place a high priority on initiating a program with the tractor manufacturers to promote standardization of the colour, graphics, location and operation of the basic controls and the location and design of remote light plugs on all farm tractors sold in Ontario. (p.66)

16. that the Agency make every effort to ensure that the training of farmers and farm workers in machinery operation and maintenance is widely available, of high quality and heavily promoted among farmers. (p.71)

17. that the Agency in conjunction with commodity associations promote a voluntary audit program covering the safe installation,

maintenance and operation of mechanical equipment on Ontario farms and design a system of awards to encourage cooperation in the program. (p.71)

18. that it be mandatory for shields and guards supplied with farm machinery to be in place when the machinery is operating and that compliance with this requirement be monitored. (p.72)

19. that shielding and guarding devices (as recommended by an authority to be appointed by the Ontario government, Recommendation 22) be mandatory on new farm machinery purchased in Ontario after a date to be specified in legislation. (p.72)

20. that training in farm machinery maintenance be offered through the Colleges of Agricultural Technology and night classes in Secondary Schools; that it be heavily promoted among farmers, farm workers and farm equipment dealers; and that those who take the training be eligible for financial assistance normally available to persons taking skill upgrading courses. (p.75)

21. that high profile awareness measures be developed and continually used to maintain farmer and farm worker alertness to the safety risks associated with the maintenance and use of farm machinery. (p.76)

22. that an existing agency (the Ontario Centre of Farm Machinery and Food Processing Technology, or the Ontario Farm Machinery Board) be given responsiblity for keeping itself informed about experience with farm machinery in Ontario, establishing standards for machinery performance and influencing farm machinery design and construction. (p.77)

Chapter Four

23. that a high profile information program warning farmers and farm workers about the characteristics of silo gas, the dangers inherent in exposure to it, and informing them of all necessary protective measures be a top priority of the Agency. (p.86)

24. that the Agency and commodity organizations representing farmers who use silos develop for these farmers a system of convenient access to reliable gas detection devices. (p.86)

25. that the Agency take responsibility for preparing and circulating to Ontario doctors information about the symptoms of dust-related diseases and the conditions in which dust-related diseases are likely to arise among farmers and farm workers. (p.90)

26. that the Agency explore problems of dust-related diseases among farmers and the availability and use of the appropriate protective equipment. (p.90)

27. that by March 31, 1988 all surface level manure lagoons and tanks on farms be enclosed by child-proof fencing at least four feet high, properly secured at the ground level and having self-closing gates and child-proof locks. (p.94)

28. that at least two metal ladders be installed in all open lagoon and tank type manure storage facilities. (p.94)

29. that to enable owners of existing unfenced manure lagoons and tanks to comply with Recommendations 27 and 28, the government provide financial assistance comparable to that already in place under the Soil Conservation and Environmental Protection Assistance Program for safeguarding new manure storage facilities. (p.94)

30. that the Agency and Ministry of Health:

    - develop means of assessing incidence of zoonotic diseases among farm people compared with the remainder of the population;

    - inform farmers and farm workers of the seriousness of health conditions that result from zoonotic diseases; and,

    - provide farmers and farm workers with information on how best to avoid contracting zoonotic diseases. (p.97)

31. that safety cages on exposed silo ladders be mandatory on new and reconstructed silos in Ontario from a date to be specified in legislation. (p.98)

32. that the Agency mount a program to encourage farmers to install safety cages on existing silo ladders that are not equipped with them. (p.98)

33. that the Ministry of Transportation and Communications in conjunction with the Agency prepare and issue explicit guidelines that will ensure consistent understanding and enforcement of the Highway Traffic Act and its regulations on the use of farm vehicles on public roads in Ontario. (p.102)

34. that there be a regular review of the relevance of the provisions of the Highway Traffic Act to farm vehicles every ten years and that the Agency be party to these reviews, the first of which should occur not later than 1987. (p.103)

Chapter Five

35. that the Agency develop and mount a program that will ensure farmer and farm worker awareness of the hazards associated with pesticides and of the need for vigilance in following protective measures. (p.112)

36. that the Agency take the lead in:

    - obtaining more precise information about the problems farmers experience in reading pesticide labels;

    - preparing a set of specific recommendations for improving the health and safety content of labels on pesticides used in Ontario;

- working out the necessary changes in labelling practices with the responsible provincial and federal authorities. (p.115)

37. that the pesticide container disposal method used in Ontario be puncturing, triple rinsing, incinerating and then disposal in an approved municipal land-fill site. (p.116)

38. that it be mandatory that farmers and farm workers observe as a minimum interval between the time of application of a pesticide and the time of next working on the crop, the greater of the re-entry period specified on the product label or that set out in the Ministry of Agriculture and Food Production Recommendations for the year and pesticide in question. (p.117)

39. that the testing of work protective equipment for use in Canada be undertaken by the appropriate Government of Canada agency. (p.117)

40. that a requirement be written into the Pesticides Act making it necessary for licensed vendors to carry, display and promote protective equipment appropriate to the pesticides they sell under schedules, 1, 2, 3, and 5 of the Ontario Classification of Pesticides. (p.118)

41. that the use of protective equipment as specified on pesticide labels be made mandatory when handling such products and that farmer observance of the regulation be monitored to a sufficient degree to ensure that it is widely practised. (p.118)

42. that health professionals be trained in the effects, diagnosis and treatment of pesticide exposure as part of the work they do to qualify for their profession; (p.119)

43. that health professionals be assured of immediate telephone access through the Poison Control Centres to treatment information on all pesticides registered in Canada and the Agency serve as a clearing house for correcting access problems. (p.119)

44. that the enforcement of the Pesticides Act be reviewed and strengthened to ensure that the farm health and safety aspects of the program are effectively handled. (p.120)

45. that the safety aspects of the distribution and application of anhydrous ammonia be studied by the Agency and, if required, appropriate controls be developed and implemented. (p.123)

46. that the Agency work with fertilizer suppliers and commodity groups to ensure that training on the properties, safe handling and emergency treatment of anhydrous ammonia exposure is available and promoted among farmers and farm workers. (p.123)

Chapter Six

47. that the Agency, in conjunction with others with expertise in skill assessment and health and safety protection, give priority to exploring the work proficiency of people doing farm work and the ways of correcting deficiencies, if any, revealed by the study. (p.129)

48. that at the time of hiring, conditions of employment be fully discussed between employer and employee with particular attention being given to work breaks. (p.136)

49. that it be mandatory that Ontario farmers ensure that adequate wash-up and toilet facilities are available with reasonable convenience to all workers on their properties and that the Agency and the local Medical Officer of Health ensure that this recommendation is observed. (p.137)

50. that the appropriate agencies mount education and awareness programs to ensure that farmers and farm workers are informed about the importance of careful observance of good sanitation practices in all aspects of pesticide use and contact. (p.138)

51. that where practical, a mechanism be developed to involve the farm worker in health and safety in the farm workplace. (p.140)

52. that the Agency devise suitable worker representation arrangements pertaining to occupational health and safety on farms, ensure that employers inform workers about them and monitor the adoption of them on individual farms. (p.141)

PREFACE

An Order-in-Council, number OC/2888/83, dated October 21, 1983, established the Ontario Task Force on Health and Safety in Agriculture. This document is its report to the sponsors, the Minister of Agriculture and Food and the Minister of Labour.

The Order stated the assignment of the Task Force as follows:

> "to investigate and report on the need for protection of the health and safety of farmers, farm workers and members of farm families engaged in farm work and to consider:
>
> (a) the nature of occupational health and occupational safety hazards in agriculture;
>
> (b) the occupations, farm work activities and types of farming where need for protection exists;
>
> (c) how the occupational health and safety experiences of persons engaged in on-farm work vary because of age, form of attachment to the agriculture industry, length of service and other relevant personal factors;
>
> (d) the problems in defining a farming operation and a farm workplace;
>
> (e) mechanisms for providing protection against occupational health and safety hazards in farm work; and,
>
> (f) if the conclusion is that legislative intervention is required, the areas to be addressed."

The Task Force was expected to complete its work not later than October 31, 1985.

The central focus of the assignment was to assess the need for occupational health and safety protection of the people who do farm work. To make this assessment the Task Force defined three principal areas of investigation:

- the occupational health and safety experience of people doing farm work in Ontario in the recent past;
- identification and assessment of the health and safety hazards of farm work; and,

- identification and evaluation of measures for improving the occupational health and safety performance in agriculture.

In each of these areas it assembled and analysed information from existing statistical sources, reports of studies, surveys and other relevant literature, meetings with experts in particular areas of health and safety concern and public hearings held in eleven centres across the province.

Data that describe the health and safety experience associated with farm work was seen as essential to the assessment of need for protection. Working through the sponsoring ministries and its own staff and medical advisers, the Task Force explored both existing and potential data sources and concluded that they could not meet its information requirements. To supplement the data found, it attempted to develop a survey of farmer and farm worker health and safety experience covering a one year period. The project had to be abandoned because of the heavy costs entailed. As a consequence, the report is based on less complete and reliable information about the work-related health and safety experience of Ontario farmers and farm workers than the Task Force considers desirable.

The data available are used where they assist objective analysis of the topics discussed. Work-related health data are practically non-existent. Some lost time injury data are available, but the nature of their coverage renders them exceedingly difficult to use. Heavy reliance has had to be placed on fatalities data, but even these need to be collected against more carefully defined criteria. The issue of information requirements is dealt with throughout the report and it is one of the two principal matters considered in Chapter Two.

The Task Force attempted to relate data on health and safety to a number of major characteristics of Ontario farming. The product of this work was Background Paper Number 1, A Structure of Ontario Agriculture as Related to Health and Safety by Earl Haslett. The study has been helpful in measuring farm employment and farm fatalities.

The major inputs to identifying and assessing farm health and safety hazards came from discussion with specialists in selected areas of concern, a series of review studies and memoranda and the briefs presented and discussions held at the public hearings of the Task Force. Major areas on which specialists briefed the Task Force were pest control, health services, worker compensation, health and safety legislation and educational programs. The sources mentioned were supplemented by knowledge of the Members and a substantial amount of literature review.

The topics selected for special study were machinery, farm chemicals and the health and safety of persons engaged in farm work. The reports, and the agencies that prepared them, are as follows:

- Background Paper Number 2, Farm Machinery Industry and Farm Safety, the Ontario Centre for Farm Machinery and Food Processing Technology, Chatham, Ontario;
- Background Paper Number 3, Agricultural Chemicals and Farm Health and Safety, Canadian Centre for Toxicology, Guelph, Ontario; and,
- Background Paper Number 4, The Health of Persons Engaged in Agricultural Work, Occupational Health Program, McMaster University, Hamilton, Ontario.*

In addition, extended memoranda were prepared for the Task Force on health and safety aspects of fertilizers, pharmaceuticals, pesticide legislation and control, the health and safety hazards associated with structures, fields and yards, and a comparison of farm fatality rates with those in construction and mining.

The material generated by the study program provided the Task Force with useful analyses of potential health and safety hazards on farms. In some instances efforts were made to assess the impact on Ontario farming of the hazards identified. Here again, the unavailability of data limited the possibility of making this type of assessment.

---

* Copies of Background Papers 1, 2 and 3 were reproduced and distributed to mailing lists provided to the Task Force by the Ministry of Labour and the Ministry of Agriculture and Food. Copies were made available to others on request. A limited number of copies of Background Paper No. 4, "The Health of Persons Engaged in Agriculture Work" were reproduced and made available to organizations engaged in research and concerned about problems related to health and safety for those engaged in agriculture.

The briefs presented to the Task Force proved to be a major source of information on farm work hazards. Public hearings, held between mid-November 1984 and mid-January 1985, were organized to draw out the views of farmers, farm organizations, farm workers, farm suppliers, social service agencies and individuals on the questions referred to the Task Force. Seventy-six written and twenty oral briefs were received. While individual farmers did not attend the hearings in large numbers, they were represented by a wide range of farm organizations (see Appendix One). One of the two major topics addressed in the briefs was work hazards. The information presented indicated the prevalence of particular concerns and, in some instances, it went into considerable depth about the nature of them and how they might be alleviated. The briefs were analysed and are used as a major resource throughout the report. The people attended the hearings voluntarily, that is, they were not called as witnesses, and the information was received as presented.

With respect to measures for improving health and safety performance in agriculture, the Task Force assembled extensive information but no special studies were done. Ontario agencies that already deliver farm health and safety services provided information on current programs. Staff members explored practices followed in several Western European countries, at the federal and state levels in the United States and in other provinces. In addition, many briefs addressed the question of how health and safety performance might be improved. The principal message brought forward was that reliance on educational programs should be continued.

The report weaves together the knowledge of the Task Force members and the content of the various sources discussed. Every effort has been made to do this carefully and objectively. This process has required many hours of debate, and the report reflects the conclusions at which the Task Force arrived.

Copies of the background material generated for the Task Force, including the briefs presented at public hearings, have been available for examination and study in the Task Force library at 434 University Avenue, Toronto.

Structure of the Report

The report consists of seven chapters. It proceeds from a description of the situation in which the need, if any, occurs to a specification of the need, first in general and then in more specific terms. It concludes with the discussion of how the needs defined might be met.

Chapter One describes both the farm setting and the health and safety setting of the problems to be addressed. The farm setting focuses primarily on farm work and farm employment. It attempts to put in perspective the questions posed by spokesmen for farming who assert that it requires different approaches to health and safety protection than are used in other industries. Some of the basic issues that are addressed throughout the report are drawn from this discussion.

Chapter Two answers, in a general way, the basic question put to the Task Force of whether or not there is a need for greater occupational health and safety protection of farmers and farm workers than is already in place. The approach taken to measure the need is explained and the problem of inadequate measurement data is addressed. The conclusion sets the stage for the analysis presented in the remaining five chapters of the report.

Chapters Three, Four, Five and Six deal with specific health and safety concerns. The first three discuss machinery, structures and surfaces, and chemicals as sources of hazards, but in Chapter Six the focus is changed from facilities and the environment to human factors. Throughout, emphasis is placed on the changes brought about by new farming methods, and only higher priority concerns are considered.

Chapter Seven concludes the report with thoughts on how a health and safety program can be made effective in Ontario agriculture.

Organization

When appointed, the Task Force consisted of the chairman and five members, four of whom were farmers and one a paid farm worker. In its November 2, 1983 meeting the Task Force agreed that it should have an additional member drawn from among paid farm workers. The Ministers of Agriculture and Food and of Labour agreed to this suggestion and an Order-in-Council dated January 12, 1984 appointed Mr. Roger Morrison of Seaforth as the second worker-member of the Task Force. In addition, Mr. Randy Lyons indicated that he had ceased to be actively engaged in farm work and resigned his Task Force membership. He was replaced by Alphonse Meunier of Blackstock on the authority of an Order-in-Council dated August 9, 1984.

Two arrangements were made to facilitate communication between the sponsoring ministries and the Task Force. First, each ministry appointed a senior staff person to advise the Task Force on government policies, programs and sources of information. These people were Mr. Bob McMahon for the Ministry of Agriculture and Food and Mr. John Kinley for the Ministry of Labour. The latter joined the Task Force as research officer on April 1, 1984, and was replaced by Mrs. Leona Watson, who moved to another Ministry in July 1985 at which time Dr. Helen Lakusta was appointed liaison officer for the Ministry of Labour. Mrs. Shirley Farmer served as administrative assistant to the Task Force and Mrs. Jean Martin, as secretary.

Second, a steering committee was established to deal with administrative and policy issues. Its members were Dr. N. R. Richards, Chairman, Dr. Ann E. Robinson, Assistant Deputy Minister, Occupational Health and Safety Division, Ministry of Labour and Dr. J. Clare Rennie, Assistant Deputy Minister, Technical and Field Services, Ministry of Agriculture and Food and the liaison officers as mentioned above.

The report was written by Mr. John Kinley, but the views expressed are those of the Task Force.

CHAPTER ONE

FARM HEALTH AND SAFETY ISSUES

The central questions to be addressed in this report are:

- whether or not the people who work on Ontario farms (farmers, members of farm families and hired farm workers) need greater protection than they presently have against the health and safety hazards of their employment; and,
- if greater protection is deemed necessary, what measures are most likely to provide it?

These questions derive mainly from two areas of concern. First, communications to the Task Force repeatedly, and sometimes urgently, stressed the need for greater protection against a range of commonly recognized health and safety hazards associated with farm machinery, farm structures and some farm work practices. Lack of information and uncertainty about the health effects of dust, gases and chemicals generated or used on farms contribute to this uneasiness. Second, there are wide disparities between the means of health and safety protection presently available to farmers and farm workers and those employed in other industries in Ontario. This situation inevitably arouses some anxiety about the adequacy of the health and safety protection in place in the farming industry.

The questions must be addressed from an understanding of the characteristics of farming that most influence health and safety performance in the industry and of the existing framework for protection. This chapter will identify those characteristics and describe the framework of protective arrangements within which that experience occurs. It will provide necessary background to the assessment to be made and raise some of the general issues that must be considered.

Definitions

In the Order-in-Council that established the Task Force, the words "agriculture", "farm", "farming", "farmer", "farm worker" and "farm work" are used to indicate the scope of its assignment. To permit effective communication, it was necessary for the Task Force to arrive at workable definitions of the terms "agriculture", "farm" and "farming".

For the purpose of this report, agriculture consists of cultivating the soil, producing crops, raising livestock, and delivering, either on or off the farm, these products to the care of a buyer or sales intermediary, and a range of services essential to these activities. The definition is drawn from the list of agricultural industries set out in Division A, Major Groups 01 and 02 of the 1980 Standard Industrial Classificiation published by Statistics Canada. It includes services rendered to farms on a commercial basis, for example, crop spraying or animal breeding.

In using the above definition the Task Force recognizes it has not clarified the agricultural status of some activities that may take place on farms. For example, some processing of crops, such as drying corn and washing lettuce, may be done by farm employees. To the extent that the processing becomes a commercial activity, that is, when the produce of other farms is handled for a price, its status as a farming activity is not clear. Similarly, many landscaping establishments have both construction and agricultural functions; this creates uncertainty about which industry they should be classified under. There appear to be a great many similar situations that cannot be fully resolved by a simple definition of agriculture. They raise complex questions which the Task Force did not have the resources to address, nor did it have a need to address them in order to accomplish its own assignment. Also, technical and organizational changes are constantly occurring that alter the extent to which specific activities are agriculture related. For all these reasons, it is more appropriate for administrative agencies and the courts than for the Task Force to decide on the precise boundaries of agricultural activity at any given time.

A farm is a geographically defineable area on which an individual farmer or corporate farm engages in agriculture to generate income. In this report farm excludes the house and house yard of the farmer and of farm employees provided such accommodation.

Farming is the work of cultivating the soil, producing crops and raising livestock carried on within the farm gate, and delivery, either on or off the farm, of these crops to a buyer or sales intermediary. It may extend beyond the farm gate to cover:

- movement on a public road between two parts of a farm;
- transportation of produce to a processing plant or other market;
- trips to suppliers, equipment maintenance depots, etc. to pick up supplies, obtain services, attend farm related meetings and like activities.

It is farming, not agriculture as a whole, which is the central focus of this report. That is, it is concerned with the health and safety of farmers, farm family members and hired farm workers in the course of doing farm work.

The Farm Setting

The 1981 Census of Agriculture enumerated 82,448 census farms in Ontario. This was 25.9 per cent of the national total of 318,361 census farms and compares to 67,318 in Saskatchewan, the province with the next greatest number.[1] Of the Ontario total, 68,960 farms, or 83.6 per cent, reported annual sales of $2,500 or more in 1980,* that is, they made a significant contribution to the owner's income.

The diversity of farms in Ontario is suggested by their size, which ranges from fewer than 10 to more than 1,000 acres. The 1981 average size was 181 acres. The acre size of farms differs greatly with the type of farming done. Those engaged in cattle, dairy and grain production are, on an average, five to ten times larger than fruit farms and greenhouse operations. The diversity is demonstrated further in Table 1, which indicates how Ontario farms and farm sales are distributed when classified by product type.

---

* In the 1981 Statistics Canada Census of Agriculture a farm was defined as having 1980 agricultural sales of $250 or more. In the 1971 and 1976 census the annual sales criterion was $50 or more.

Table 1
Number of Farms (1981) and Value of Product Sales (1980)
By Farm Type

Type of Farm	No. of Farms	Value of Product Sales
		Millions of Dollars
Dairy	13,277	983.0
Cattle	23,774	1,089.5
Hogs	5,385	398.3
Poultry	2,744	420.1
Sheep and Goats	1,479	9.2
Livestock Combination	2,917	151.3
Horses	1,128	35.1
Other Animal Specialty	773	27.2
Sub-total	51,477	3,113.7
Wheat	981	9.9
Small Grain	6,517	255.7
Oilseed	3,431	111.2
Grain Corn	5,689	314.4
Forage	1,724	11.3
Dry Field Pea and Bean	204	6.3
Tobacco	2,258	276.9
Potato	272	31.6
Field Crop Combination	308	23.1
Sub-total	21,384	1,040.4
Fruit	3,213	104.7
Vegetable	2,328	120.4
Greenhouse Products	1,413	147.3
Nursery	545	60.1
Sub-total	7,499	432.5
Other Combination	2,088	105.1
TOTAL	82,448	4,691.7

Source: Statistics Canada, Census of Agriculture, Ontario, 1981

The method of assigning farms to a particular product type results in the Table 1 data concealing the extent to which mixed farms contribute to Ontario agriculture. The combination categories are by definition mixed. However, a dairy or grain farm may engage in several product areas other than the major one to which it is classified. For example, it is commonplace for dairy farms to grow forage, grain and vegetable crops. Since this type of multi-product farming is widespread the extent of mixed farming is underestimated in the Table. The importance of this aspect of diversity to occupational health and safety is that it increases the number of farming methods, products, skills, machines and other factors with which a farmer has to be familiar and, consequently, the complexity of his* work.

An evaluation of the need for occupational health and safety protection in Ontario farming must take into account the characteristics of the industry that shape this need. They are discussed immediately below in terms of farm work, farm employment and economic conditions as they relate to occupational health and safety.

Farm Work

By 1985 much of the hard, repetitive physical effort that once characterized most farm work had been removed from it. The traditional tasks of pitching hay, pumping water, holding ploughs, cleaning stables and cultivating crops by hand have largely been taken over by machines and other innovations in farming methods. These developments have sharply reduced or eliminated the time spent on the burdensome activities of digging, stooping, lifting and carrying. They have been replaced by machine operation and maintenance; by using chemicals to protect crops and livestock, to maintain sanitary conditions and promote growth; and by the monitoring of immediate work processes and such matters as the maturity of crops, ground moisture levels and the readiness of animals for market. In short, the new technologies used in farming have reduced the physical human effort required to achieve production objectives and have greatly increased the planning, managing and monitoring dimensions of the inputs needed.

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* In this document the word farmer refers to a male or female farm owner/operator and "his" when referring to farmer should be understood in the same way.

Despite the trend to lighter and more knowledge-based work activity, some farm tasks have not been easy to restructure in this way. Repetitive hand labour remains a major part of planting seedlings; harvesting fruit, vegetables and tobacco; feeding animals; and cleaning and maintenance work. Most of these activities do not require great physical exertion but they may be tiring because of, for example, long periods of kneeling, stooping or reaching entailed in the task to be done. Extremes of physical effort are likely to be demanded only intermittently, perhaps in handling animals or resolving field emergencies.

Variety in the activities performed is another farm work characteristic likely to influence the safety and perhaps the health of workers. For example, in any one day a farmer may complete a range of tasks in several different areas of work, such as animal care chores, field work, machine and physical plant cleaning and maintenance, family or employee supervision, selling produce and many others. As already suggested, the breadth of this range varies with the size and type of farm. Generally, it is greatest where only one or two people operate a small to medium-sized farm and have several different farming enterprises to attend to, for example, a dairy herd, forage and grain crops and an apple orchard.

While farm work varies in terms of the fundamental activities performed and the types of worker effort demanded, it is shaped in other ways by the major characteristics of farming. Important among these are the immediate concern with natural processes, the nature of the farm workplace and the use of advanced technology.

Perhaps the most distinctive characteristic of farming is its involvement with living things. The fundamental activites are growing, nurturing and harvesting (in the broadest sense) plant and animal products. A few other industries, such as forestry, fish hatcheries, biological laboratories and human health care are also engaged in generating and sustaining life, but in rather different contexts. The fact that these biological processes are carried on, to a great extent, out-of-doors means that the weather is almost as important a factor in shaping farm work as the biological processes themselves.

These natural factors (biological processes and the weather) impose their own sets of requirements on the physical facilities of farms, the work done and, especially, work schedules. In Ontario many crops are planted and harvested once a year within relatively short periods of time, causing seasonal peaks in work loads. If the farmer fails to meet the schedule imposed by the weather and crop in question, both planned production and his income are likely to be reduced below anticipated levels. Where livestock is involved, special housing and flexible work schedules may be necessary to guard against loss of the young and disease and heat, cold or rain. Some of the uncertainty associated with these natural characteristics may be relieved when plants and animals are reproduced and grown in controlled environments, but monitoring the safe and healthful operation of such facilities is likely to require constant attention and a thorough understanding of the hazards peculiar to them.

Fluctuating work loads, sometimes unpredictable, and close contact with animals and plants are the aspects of farming arising out of natural processes that are most likely to impact on worker health and safety. The former result from seasonal farm activities or growth cycles, but may also be generated by such diverse causes as short-term weather conditions, pests or marketing opportunities. They frequently give rise to long hours of work, hurry, tiredness, stress and, possibly, neglect of good safety practices. Animals and plants are associated with human health problems that range from allergies through infectious diseases. Also, handling them may be the source of strenuous physical effort, bringing about strains, bruises or more serious injury.

The health and safety consequences of farm work are also shaped by the nature of farm workplaces.* They tend to be large and varied in comparison with those provided in manufacturing and perhaps most other forms of employment. Major exceptions to this are in the logging, transportation and fishing industries, where the size of the workplace may be very much greater and the level of familiarity with it that can be acquired very much less than is possible on even the largest farm.

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* Workplace is used to refer to a field, stable, roadway, silo or any other farm location where work is done. A work station is more specific, that is a tractor seat, peach tree or horse stall.

A second consideration is that the workplace may differ for different farm workers. The farmer and permanent employees are likely to work almost anywhere within the geographic limits of the farm, and at times, on highways, in the stores, yards and docks of suppliers and buyers and in other locations where work necessary to farming is done. For some temporary or part time help the workplace may not extend beyond the strawberry patch or the stable and milking facilities and the farm access routes to them. Both these situations are found in other industries. For example, the maintenance man in a large plant or a construction carpenter will work in many locations, while a press operator or fish packer usually remains in a limited area, repeating the same or highly similar work movements.

Farm workplaces include many different work stations. These may all be substantially the same as in berry picking or milking or as radically varied as the comfortable cab of a tractor to an open field on a cold fall day while repairing the machine the tractor tows. Many farm work stations are almost continually mobile or subject to intermittent change of location. The resulting change of environment calls for constant attention and a succession of different responses from the worker. This variation may be augmented by the seasons and shorter term weather conditions and by conditions inherent in specific production processes. For example, dust is a consideration in harvesting forage and grain crops, and noise, dust and fumes are associated with raising hogs.

The unique characteristic of the farm as a workplace is that it is also a place for children to live and play. While the Task Force definition of a farm excludes residences and their associated yards, it cannot remove the proximity of the house to the farm and the activities going on there. Many aspects of living and, particularly, children's play spill over onto the farm. Frequently, children make adults' work part of their play activity and it is not unusual for parents or older brothers and sisters to encourage this. At the same time, few playgrounds are as inviting as farms with their real machines to climb on and, perhaps, to operate, animals to pet, space for running and places to hide. In this environment children demand and get extensive freedom. They also add a dimension to farm safety which is present in few other work situations and, perhaps, in no other work environment is their intervention so difficult to control.

Farm workplaces are large and often rough, steep, high, slippery, cold, isolated, untidy or may have other features that are potential risks to the health and safety of workers. The fact that farm work involves a great deal of movement about many different types of locations, the conditions of which may vary with the weather, means that the work may demand high levels of skill and attention. The conditions outlined mean that the farm worker is frequently alone and has to respond to changing environments, sometimes unexpected ones. Whether or not similar conditions are faced by workers in other industries is not the issue. The fact that they occur in farming and that they are likely to be the source of health and safety hazards at work is. Finally, the presence of children in workplaces on farms can lead to unwise actions, distract attention, create unexpected situations and, too often, lead to the most regrettable results.

While natural processes and farm workplaces shape farm work, they have not changed it greatly in recent years, but new technology has. Men who are still active farmers in Ontario have personally made the change from a team of Clydesdales to a 100 horsepower tractor, from a hoe to chemical control of weeds, and from typical dairy herds of a dozen to four or five times that many cows. The phrases used to describe these developments are "new technology" and "modern farming methods". In Ontario, as around the world, these changes have, over the past one-and-one-half generations, reshaped farming practices and farm work.

These new farming methods have been a factor in bringing about increased size of farms, greater capital investment, higher output per worker, and in altering the nature of farm work. The magnitude of the change is suggested by the 121 per cent increase in output per person-year[2] of farm employment which took place between 1960 and

1980.* While farm labour inputs fell, total farm cash receipts measured in constant dollars, increased from $872,530,000 to $1,320,756,700 over the 20 year period.[3] Constant dollar farm cash receipts per person-year of labour in farming rose from $5,175 in 1960 to $11,430 in 1980.

While new technology has increased farm production it has also been largely responsible for the reduction in physical human effort in farm work mentioned in the first paragraph under this heading. That reduction has been made possible by the substitution of machinery to till the soil, to care for and harvest crops and to store and otherwise handle produce, feed and wastes. This machinery is powerful, runs at high speeds, may be unstable and has many moving parts, some of which in early designs were unnecessarily exposed. The machines are mechanically complex and, in the exposed conditions of farm use, are subject to operating failure and more serious breakdown. They are found throughout the farm in fields, buildings and yards, and have introduced a very different pace of work and level of skill requirements than were demanded by Clydesdales and the hoe. There is little wonder that three-quarters of farm work fatalities have, in recent years, been machine-related.

The new technologies are not confined to machines. Chemicals and pharmaceuticals have found widespread use in weed and insect control, in protecting animals from disease and as feed additives and fertilizers. Because some of them are toxic or because they otherwise affect human health, they are of concern to all farm workers. This concern is increased by the facts that some of the symptoms of acute exposure are

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* Because farm employment data is not a good measure of labour input on farms, a measure in terms of person-year equivalents was developed, that is, the number of 52 week years of farm work done. The estimates made were:

Year	Person-Year Equivalents
1960	168,610
1970	125,371
1980	115,548

Source: Haslett p.43.

easily confused with those of other forms of illness and that repeated low level exposures may have long delayed health effects.

Accompanying the changes outlined above in power sources, processing equipment and crop and animal protection are new approaches to regenerating and nurturing plants and animals. Generally, these involve the use of relatively small areas or buildings that provide varying degrees of confinement and in which large numbers of plants or animals are produced. In the case of animals, they are associated with feed and waste storage practices, which are characterized by mechanized handling and by efficiency in promoting growth. These production methods have increased the importance of dusts and noise as health hazards, the urgency of disease control and the danger of heavy accumulations of fumes and gases over those that occurred when barns and sheds were naturally well ventilated and feeds and wastes were present in smaller volumes. Somewhat similar conditions arise in mushroom barns and greenhouses where concentrated crops have to be protected against pests and work may be done under hot, humid and slippery conditions.

The developments outlined have reshaped the health and safety risks of much farm work. Available data do not show how the health and safety experience associated with modern farming methods compares with that of the period when horses and people provided most of the energy used. It is clear that many of the accidents that occur now are different from those experienced in that earlier period but the relative numbers and severity are not known. The major areas of concern are in the operation of sophisticated, high speed machinery on terrain that is frequently wet, rough, steep or isolated and, all too often, includes banks and ditches where it is not designed to be used. The maintenance of this machinery presents a different set of problems, both in the maintenance process itself and the complexity of the work required. Similarly, the toxicity of chemicals and gases and factors such as noise have taken on a greater health and safety importance in the farming environment created by new technologies. The concern is that farming may be lagging behind other areas of work in recognizing the occupational health and safety problems associated with these changes.

In summary, farm work is seen by the Task Force as continuing to be varied and active employment demanding an exceptionally wide range of skills. It has lost much of its earlier requirement for physical effort but some of this remains in tasks where mechanization is difficult and costly. The natural processes with which it is involved create greater than ordinary scheduling problems, which shape working conditions and sometimes human responses in ways that may lead to injury or illness. Farm workplaces are large and, in conjunction with the mobility of the work done, result in a constantly changing work environment that demands different worker responses. Perhaps more important than any of the above are the changes in farm work introduced by new technology. The essential features are higher level and more knowledge based skills, greater responsibility in terms of financial and safety risks and a much greater emphasis on the management role of the farmer and some farm workers. Whether or not these changes have been fully recognized and understood by all the farmers affected by them may be questioned. They have sharply increased the level of responsibility that farm workers and, especially farmers have to assume for work-related health and safety. The need for recognition and acceptance of these responsibilities underlies the specification of them in sections 13 to 19 of the Occupational Health and Safety Act.

Farm Employment

During the five- year period, 1980 to 1984, on-farm agriculture provided 3.3 per cent of Ontario employment.* On an annual average basis, this amounted to 135,600 workers out of a provincial employment total of just over four millions. As an employer of paid workers agriculture plays an even smaller role. In the five- year period mentioned, only 1.4 per cent of all Ontario paid workers were in farming.

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* Unless otherwise indicated, the employment data shown under this heading are derived from Statistics Canada, Labour Force Annual Average, 1975-1983, Catalogue 71-529 or from The Labour Force, December 1984, Catalogue 71-001 Monthly. Most of the data shown refer to the five-year period, 1980 to 1984 inclusive.

Perhaps the most important characteristic of farm employment that influences attitudes and practices pertaining to occupational health and safety in the industry is the dominance of its self-employed component. Farmers and unpaid farm family workers together make up 60 per cent of the people working on farms. For all non-agricultural industries the comparable proportion for the 1980-1984 period was 7.2 per cent, the remaining 92.8 per cent being hired workers.

Farmers

Farmers account for 45.5 per cent of Ontario farm employment. Between 1980 and 1984 the the annual average number was 62,000* with 17,000 of these being employers. The remaining 45,000 were persons operating farms without hired help, that is, own account farmers.

There is limited descriptive information on the occupational health and safety of farmers as a group. They are generally independent-minded entrepreneurs who are primarily concerned with attaining greater production and profitability from their farms. However, their age and educational attainment are relevant health and safety variables.

Age may influence the readiness and energy to understand and apply new ideas. In its hearings, the Task Force was repeatedly told that younger farmers who have had some special training in colleges, Junior Farmers or 4-H Clubs, are more concerned about health and safety and more inclined to look for safe ways of doing things than older ones are. In

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* There is a 20,448 difference between this number and the number of farmers (82,448) reported in the 1981 Census of Agriculture. The Census counted farms earning $250 or more annually from sales, but the labour force data count active farmers. Almost certainly, the difference is explained by people identifying themselves in the Labour Force Survey with the occupation that provides their major source of income, for example, artists, automobile assemblers, stock brokers and doctors. This explanation is supported by the fact that in 1980, 13,488 of the 82,448 farms represented sales of less than $2,500. At the same time, some of the difference is almost certainly explained by the existence of fewer farms. (See Haslett, Figure 3, p.20 and related text.)

1981 almost 12 per cent of farmers earning $2,500 or more were 65 years of age or older and nearly half of these were in their seventies.[4]

Farmer and farm worker education levels are almost certainly important variables in health and safety performance on a technically advanced farm. In light of the heavy emphasis placed by briefs to the Task Force on education as the preferred method of health and safety protection, the capacity of farmers to respond to it must be a consideration. The data in Table 2 compare the educational attainment levels of Ontario farm owner/operators in the years 1971 and 1981. Over the decade the proportion with some post-secondary education increased from 9.8 per cent to 26.4 per cent and that for farmers with less than Grade 9 fell from 55.8 per cent to 36.0 per cent. In 1980 this latter proportion compared to 19.6 per cent of the population 15 years of age and over not attending school full-time who had achieved less than Grade 9.[5] Since Grade 9 is a widely accepted threshold of functional literacy in work situations[6], and this view is concurred with by the Canadian Association for Adult Education, some farmers may be taxed to comprehend such matters as the detailed instructions that accompany farm machinery and the labels on farm chemicals.

Table 2
Educational Attainment of Ontario Farmers

	Farmers	University Degree	Post-Secondary	Grade 11-13	Grades 9&10	Less than Grade 9
1971	94,920	4,215 (4.4)	5,120 (5.4)	13,525 (14.2)	19,130 (20.2)	52,930 (55.8)
1981	82,448	9,775 (11.9)	11,950 (14.5)	15,955 (19.4)	15,110 (18.3)	29,660 (36.0)

Source: Statistics Canada, Census of Agriculture, 1971 and 1981.

It is common practice for Ontario farmers to engage in off-farm employment. To the extent that these people are personally operating an active farm, the practice carries with it the likelihood of the farmer working excessively long hours and having heavier than ordinary responsibilities. It may also serve to inform him about safety awareness and practices in other industries. Census of Agriculture data for 1981 indicate that of the 82,448 farmers reporting, 36,406 did some off- farm work.[7] However, they performed only 22,000 person-years of such work. This compares to an estimated total input of labour on farms by all categories of workers of 115,548 person-years.

Unpaid Family Workers

It is commonplace in Ontario for members of farm families to share in the work to be done on farms without having a defined pay arrangement. In practice the compensation is food, shelter, clothing, use of the car, and, perhaps, other forms that may include vacations or support at school or university. This employment may be full-time, confined to assistance with chores for a few hours per day or week, or be undertaken on a seasonal or peak work load basis at planting and harvest times.

Between 1980 and 1984 unpaid family workers supplied 14.5 per cent of farm employment and averaged 19,600 workers annually. However, the amount of labour done on this basis appears to be declining. Because of Workers' Compensation coverage and the increasing need of all persons for some cash, it seems likely that this decline is explained in part by a shift of family workers from the unpaid to the paid category. Other than anecdotal information that confirms that spouses, sons and daughters frequently participate in farm work, there is little information available that describes their experiences in doing it. For that reason this group of workers may rarely be segregated in the remainder of the report except where their work activity clearly is related to a particular hazard or concern.

Hired Workers

Over the past five years the number of hired farm workers in Ontario has averaged 54,000 and made up 40 per cent of farm employment. This share compares to 92.8 per cent in all non-agricultural industries and represents substantially less than one full-time hired worker per Ontario farm.* The only major industry, other than agriculture, where the proportion of hired workers in total employment falls substantially below 90 per cent is construction, where it ranges between 82 per cent and 86 per cent annually.

The two broad classes of hired workers on Ontario farms are permanent employees who work full-time throughout the year and those employed on a seasonal or peak work load basis. There is some gradation between the two groups. This arises because of people who work as required or in part-time employment on a daily, weekly or other short-term schedule. While it is not a guide to numbers of workers in the two groups, full-time and seasonal hired farm workers contributed approximately the same number of weeks of employment during 1980, respectively 859,458 and 861,720 weeks.[8] However, the former number was distributed among 10,722 farmers employing full-time workers while, 26,812 farmers employed those working part-time. Because of the relatively short periods of employment of many seasonal workers they clearly comprise the larger group of individuals.

There may be little, if any, distinction between a full-time hired worker and the employing farmer with respect to production tasks done and risks taken. These situations demand that the hired worker have a wide range of skills and exercise judgment at levels that significantly affect the success of the farm. Such people require extensive experience and training, and, in many instances, approach the role of partners in terms of degree of responsibility assumed. This sort of relationship is most likely to develop where one permanent employee is on the farm. At the same time, permanent hired workers on some farms, and almost certainly on larger ones, specialize in certain tasks and, in terms of responsibility assumed, fall somewhere along a scale between the two extremes noted above.

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* For more information on hired worker per farm see Haslett, p.27.

Seasonal or shorter-term workers are engaged primarily to do defined areas of work much of which is likely to be repetitive hand labour. Typically, their work requires limited judgement and can be done with little training. Examples of what they do are planting, harvesting tobacco and fruit, and some crop care activities.

For most of their seasonal employment requirements, farmers attempt to develop reliable sources of supply, which they draw on each year. These may be local people who do farm work for a major part of their income; urban residents, frequently first generation immigrants from Southern Europe or Pacific Rim areas, who commute daily or weekly to the fields; "off-shore" workers from Mexico and the Carribean Islands who come to Ontario under agreements to work for a minimum of six weeks and a maximum of seven months per year; and, domestic migrant workers from elsewhere in Ontario, Quebec or the Atlantic Provinces. From among these people farmers tend to develop core groups of workers who do the different tasks that come up as the season progresses.

In addition, the seasonal work force includes people employed only to handle peak planting and harvesting tasks. They may move from farm to farm as different types of fruit or vegetables come to maturity. While some such workers are experienced, many are not and have limited attachment to farming. Some may return year after year, but it is not unusual for them to be drawn from local labour markets on a casual, sometimes daily, basis.

Farmers and some hired workers may have different perspectives of what health and safety protection is needed, and clearly do have different perspectives of how it can best be achieved. These differences were made evident to the Task Force in the material presented at its public hearings, and are consistent with normal expectations of employer and employee attitudes on these matters.

Hired workers generally want to have the protection of occupational health and safety legislation. While hired farm worker input to the Task

Force was too limited to permit firm conclusions to be reached on this issue, that which was forthcoming was strongly in favour of hired farm workers being covered by the Occupational Health and Safety Act. This view may not be held where employing farmers consistently take reasonable care to ensure safe and healthful working conditions. On the other hand, where employers are lax about assuming responsibility in this area the employees appear to feel discriminated against by their exclusion from the Occupational Health and Safety Act, and pointed out that this arrangement is inconsistent with section 15 of the Charter of Human Rights and Freedoms, which assures citizens of equal rights and equal benefits under law.

In contrast, the own-account farmer may see little reason why he should comply with comprehensive occupational health and safety legislation. More generally, farmers recognize that there may be some aspects of health and safety protection on farms that need to be made mandatory, but there is a strong position that legislation should be used only where a clear case can be made for it and where other protective measures are ineffective. However, it is recognized that where there are employees on farms this fact has to be taken into account in making determinations about what protective measures are required and the farmer must assume responsibility for ensuring that equipment and facilities are in safe operating condition and workers correctly instructed in the tasks they have to do. Thus, a major issue facing the Task Force is how to reconcile in a practical program the quite reasonable health and safety protection interests of the different groups of workers referred to it.

Economic Conditions

The Task Force has not made an independent assessment of the current or long range economic situation in Ontario agriculture. It has, however, been made very much aware of the close link between farm income and the health and safety risks of farm work. Low income leads to the use of old and poorly maintained machinery, greater work effort by the farmer and farm family than is consistent with good health and safety practices and to stress associated with farm operation. That these factors can contribute to injuries and illness was heavily emphasized by individual farmers and others appearing at the Task Force's public hearings but no data measuring the relationship in question were presented.

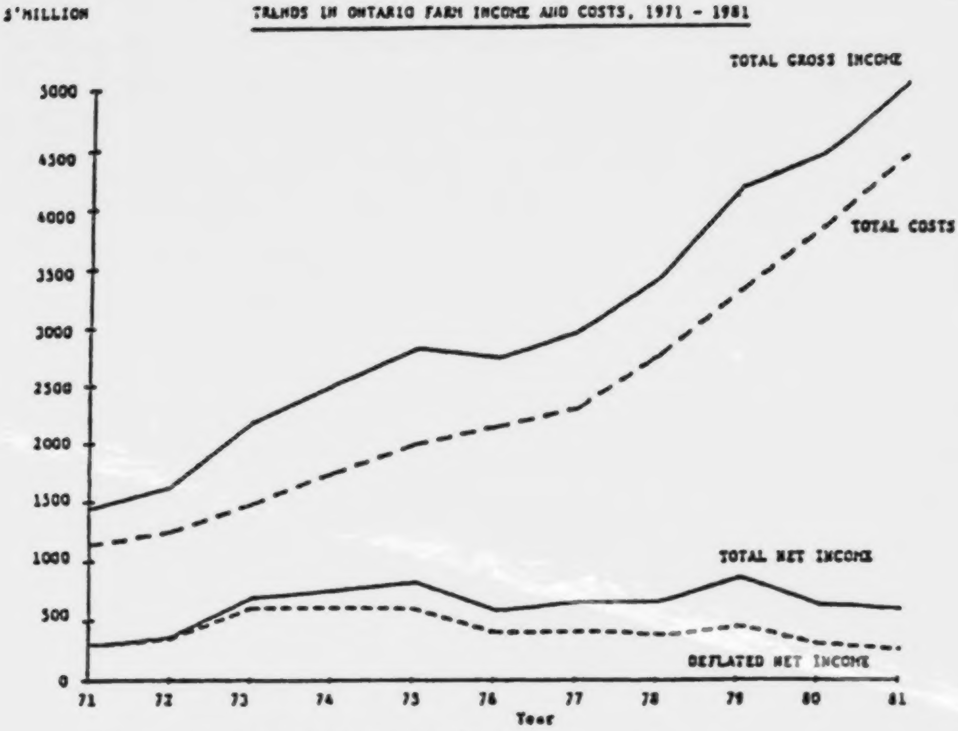
The economic situation of farmers is discussed in a 1981 study prepared for the Ontario Federation of Agriculture which examined trends in farm income and farm costs as a basis for assessing policies that would provide secure food supplies and financial security for Ontario farmers. With respect to income, the study reported that:

> "During the 1970s farm gross income in Ontario increased greatly (Figure 1). Growth in gross income was particularly rapid in 1973, 1974 and 1975, (when world food prices rose following the food crises of 1972-74) and in 1978, 1979 and 1980.
>
> "Total farm costs (operating costs and depreciation charges) also moved sharply up during the 1970s. The result was that total net income advanced steadily from 1971 to 1975, decreased to a lower level from 1976 to 1978 and then increased for one year (1979) before falling back. However, net income figures in this period can be misleading because of the steady decline in purchasing power of the dollar. Deflating the total net income by the "Consumer Price Index for Canada" gives a picture of a deflated net income that rose from 1971 to 1973, remained fairly high for the next two years and declined since 1975."[9]

The report notes that it is understood that these measures of net income (whether total net income or deflated net income) are not the only measure of farmers' economic well-being. Farm asset values increased during the 1970s and must also be considered. However, legitimate concern can be expressed when deflated net income in 1980 and 1981 is on approximately the same level as it was ten years earlier. This is associated with an increase in interest charges from $78 million in 1971 to $465 million in 1980. As a proportion of total farm costs, interest charges rose from 6.8 per cent to 12 per cent.

This heavy debt load suggests that the high cost of farm credit may divide Ontario farmers into two groups - those who are able to maintain a satisfactory income and asset position because they did not have to borrow or their borrowings are relatively small and those who are unable to retain a satisfactory income and asset position because of large borrowings. This view appears to be supported by published material based on data compiled by the Canadian Bankers Association.

Figure 1



Source: Statistics Canada and Economics Branch, OMAF

> "Net farm income failed to keep pace with the general rate of inflation throughout the 70s. The real purchasing power of net farm income in 1983 was about two thirds of that in 1971. Those who bought farms in 1969 had the benefit of a relatively low price for the land, by going into a small debt with modest fixed interest rates. They received the full benefit of record farm income levels of the 1973-76 period and a 400% increase in the value of their farmlands."
>
> "Those on the other hand who bought in 1979 purchased at peak prices, saw only sliding incomes, experienced exceptionally high interest rates and have since seen property values fall."
>
> "It is relevant to tell the story of the 70s because it dramatizes that not all farmers suffered from inflation. Some gained significantly; farm failures during the inflationary 70s were almost impossible."[10]

The situation that prevailed at the end of the 1970s and the beginning of the 1980s has made it extremely difficult for farmers who borrowed heavily in that period to maintain satisfactory net incomes. As already indicated, these situations can lead to stress and shortcuts by producers as they try to maximize production per man-hour and per machine-hour worked. The resulting tiredness and stress-related inattention unquestionably increases the risk of fatalities and lost time injuries.

Another factor that farmers believe contributes to their difficult financial situation is the relatively low cost of food. This is indicated by figures reported to the United States Department of Agriculture in 1980. At that time a citizen of Ottawa had to work 8.5 hours to purchase a "grocery basket" of 21 common commodities. The same basket purchased in Washington was as inexpensive as in Ottawa, but the work- time required to purchase the same basket of food in Stockholm was 13.5 hours, in Rome 15.5 hours, in Tokyo 26 hours and in Copenhagen 10 hours. These relationships reflect the efficiency of Ontario agriculture. Cheap food is the result of low cost farm supplies obtained competitively from the cheapest source, low cost efficient farm production and low cost processing and marketing. If in this process more financial inputs are required to assure appropriate levels for health and safety, this, surely, should be reflected in the cost of food. It cannot be denied that all of society, whether producer or consumer, benefits from a continuing supply of high quality food at reasonable cost and also from safe and healthful work on farms.

Health and Safety Setting

Although occupational health and safety in Ontario farming is not focused by a comprehensive piece of legislation or program, the matter has attracted increasing attention in recent years. This is made manifest in the activities of both private and public organizations and through limited legislative intervention. The latter occurred mainly through farming being covered by broad legislative measures pertaining to such matters as public health and the environment. However, only in the Farm Safety Association is the protection of farmer and farm worker health and safety a full-time assignment.

The thrust of these health and safety protection initiatives has been mainly educational. In response to growing evidence that farm mechanization was accompanied by "too high a price being paid in human life and injury",[11] the Department of Agriculture* established a farm safety program in the late 1950s. The organizational arrangements were a small staff in the Department, the Agricultural Safety Council of Ontario and county safety councils. Overall, their function was to promote farm safety and provide information and education directed to that end. They did this through provincial and local meetings, use of the media, developing information and endeavouring to involve farm people in safety work. The Department's county based Agricultural Representatives and their staffs played a major part in organizing the local councils and guiding their activities.

The next major step in farm health and safety came with the 1966 changes in the Workmen's Compensation Act, which made compensation coverage compulsory for hired farm workers and opened the possibility of funding health and safety education in agriculture from Compensation Board assessments. To take advantage of this income source, sponsorship of the Farm Safety Council was transferred from the Department to the Board in 1970 and it was replaced by the Ontario Farm Safety Association in January 1973. For the most part, the county organizations continued as local safety councils or associations. They receive some program assistance and limited financial support from the Association, but are largely independent of it with respect to activities and organization.

The Association is supported by funds collected from farmers who use the compensation program and which are administered by the Workers' Compensation Board. The program of the Association is planned and guided by its own board of directors, which is made up of farmers. Major components of the work are provision of relevant performance, hazard and safety practice information; consultation on health and safety problems; audits of conditions on individual farms; and a wide range of training and awareness activities ranging from promoting safety instruction in public schools to organizing and conducting seminars and conferences.[12] To implement this program, the Association maintains a small central staff in Guelph and seven positions for consultants serving different regions of the province. These people are in daily contact with farmers and farm organizations.

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* Now the Ministry of Agriculture and Food.

In 1984 the Association spent $727,436 to operate its program. This was directed, in large part, to farms that are major employers, but the Association attempts to reach all farms through its information services and responses to requests for assistance. It does not have the resources to carry the program in a more "pro-active" manner to the many small farms in Ontario. A major factor in this deficiency is that the Association's funding is generated by approximately a third of the farms in the province, those carrying compensation coverage. Thus, if its services are to be made generally available and more effective, a broader funding base seems to be necessary.

With the establishment of the Farm Safety Association, the Ministry of Agriculture and Food reduced its formal involvement in farm health and safety education, but it maintains many activities that support or complement the Association's work. Perhaps the major components of this support are provided by the Ministry's staff in each county and the radio broadcasting services it provides.[13] Each month, twenty different half-minute announcements, for which the Association prepares the scripts, are released by twenty radio stations in farming districts. There are also cooperative projects in the production and release of television and film programs. Second, the extension activities of the Ministry promote safety as an aspect of farm work and life through its 4-H Clubs, Junior Farmers' projects, the Women's Institute and various staff services. While none of these agencies, other than twenty-one 4-H Clubs, have their primary interest in farm health and safety, it is a component of the program of each. Third, work health and safety benefits derive from the Ministry's testing and control responsibilities. For example, the Veterinary Laboratory Services Branch plays a key role in diagnosing diseases of animals that are transmittable to man and by testing foods and grains for toxins and mycotoxins that may be poisonous to both man and animals. Similarly, the Agricultural Laboratory Services Branch carries out extensive testing related to pesticides; some of these are human exposure studies.[14]

The major industries supplying the farm market with equipment and materials maintain arrangements for informing farmers about the safe use of their products. For the most part, this is done through dealers and their sales staffs. The emphasis on dealer training of farm customers varies with the type of products sold. Those supplying chemicals undertake a very substantial amount of training relating to pesticides and other products. Both individual suppliers and the Canadian Agricultural Chemical Association contribute to this through programs directed to either dealer or farmer training or both. Important among the courses given are ones relating to vendor certification, calibration of spraying equipment, metric conversion and special seminars for both vendors and growers. Similarly, the machinery industry offers training in the use of its products, and a number of its organizations undertake training of both dealership and farm personnel.

Finally, the major product groups in Ontario agriculture have associations or marketing boards that represent farm production and market interests. They already play a limited role in health and safety. The recent research into health hazards in hog confinement facilities sponsored by the Pork Producers' Marketing Board is the outstanding example of such involvement.[15] More generally, they serve as channels of communication and provide members of the board of the Farm Safety Association. The Task Force and some of the commodity organizations themselves see room for growth in their role in health and safety work.

A different dimension of the health and safety setting is found in the programs of government departments. This appears mainly because of the broad scope of legislation administered by the Ministries of Health, the Environment, and Transportation and Communication. In the case of the Ministry of the Environment, the Pesticides Act and its regulations have extensive application to farmers and cover important aspects of health and safety protection in the use of crop protection materials. Similarly, lodgings and other sanitary conditions on farms are covered by the Health Protection Act, administered by the Ministry of Health; the Medical Officers of Health have extensive powers to intervene in any situation on farms or elsewhere where they believe a public health problem may exist. Under the Highway Traffic Act a substantial number of regulations impact on the use of farm vehicles on public roadways. Most of this legislation sets out requirements for inspection or compliance with performance oriented regulations or guidelines.

The above outline of the health and safety setting of farm work in Ontario demonstrates that a number of protective measures are already in place. Also, it is clear that they are dispersed among many agencies, are uncoordinated and lack the capacity to deal in an authoritative way with some of the central issues of farmer and farm worker protection. Further, the educational and monitoring programs lack the resources to maintain immediate contact with the majority of farmers. The result appears to be a situation of non-involvement and, certainly, of non-participation of most farmers and farm workers in health and safety protection. In addition, some of the legislation that protects farmers and farm workers is administered in ways that leave them uncertain about what the requirements are or without a sense of urgency of the need to comply with the standards set. The points made here about the effectiveness of existing programs will be discussed in more detail in the remainder of the report.

Issues

A number of issues arise from the discussion of the farm and program settings of occupational health and safety on farms. Important among these are:

- the concern farmers and farm organizations have about being required to comply with programs or regulations that may not be sensitive to the characteristics of farming, farm work and farm workplaces;
- work scheduling is almost certainly more uncertain in farming than in most other occupations and, as such, is a source of health and safety risk that may be seen from different perspectives by farmers and hired workers;
- the wide variety of skills always required in Ontario farming has with increasing mechanization and the use of other advanced technologies become of more critical concern. This change appears to have increased the levels of proficiency required. Despite this change, limited effort has been made to assess its health and safety impact on farmers and farm workers. The employment arrangements already outlined as being characteristic of farming and the lack of employee organization in the industry may militate against these aspects of technical change being addressed;
- the extensive use of hired workers on farms and the employer role of farmers, which arises from this

practice, has raised concern about the readiness of some members of both groups to accept the responsibility for health and safety at work;

- the prevalence of almost equal groups of owner-operators and hired workers doing farm work presents different sets of employment relationships than are present in most other industries. Where these are satisfactory to both parties and sensitive to health and safety concerns it is important that they be recognized and reinforced. Where such a situation is not present, different health and safety measures may be needed to satisfy the different groups of workers;

- the present framework for health and safety protection on farms relies heavily on education as the appropriate delivery vehicle. However, there is wide recognition of limited farm community participation in the educational programs. It raises serious questions about the design of the educational programs or the effectiveness of them as the basis for a health and safety protection system; and,

- current health and safety initiatives in farming lack focus, coordination and the capacity to exert an effective influence on much of the farming community, government and agencies in the private sector that have major stakes in farming as a market for their products.

The Task Force is concerned that an approach be developed that permits the views of all interested parties to be reflected in the health and safety protection measures adopted in farming and that these measures be overseen by an agency with comprehensive responsibility in the area. The assignment of the Task Force instructs it to assess the need for health and safety protection for "farmers, farm workers and members of farm families engaged in farm work." As already noted, farm employment consists approximately of 45.5 per cent farmers, 40 per cent hired farm workers and 14.5 per cent members of farm families. Each of these groups has a different employment arrangement and different responsibilities with respect to farm health and safety protection. Also, because of their employment in farm operations, workers in all of these categories are excluded from coverage under the Occupational Health and Safety Act.

Where possible, the Task Force believes that a single approach should be taken to the health and safety protection of the three groups. In assessing their needs or designing the delivery of health and safety programs, it should be borne in mind that there is a great deal of common ground between them. For example, the need for rollover protection on tractors exists whether or not the operator is a hired worker or a farmer. The farmer has a responsibility to ensure that the tractor is in safe working condition and shares with the employee the responsibility for his safe handling of it. This situation is true for many of the hazards considered in the report; however, in the areas of responsibility for safety of plant and equipment, and some of those relating to working conditions, there are differences that stem from different employment arrangements.

In the present structure of the Ontario government these differences are reflected in the roles of the Ministry of Labour and the Ministry of Agriculture and Food. The former has more to do with the protection of hired workers and the latter with the interests of farmers and farm families. Despite this distinction, the Task Force believes that it would be appropriate to design and administer occupational health and safety programs in farming as one comprehensive responsibility for all the people doing farm work. While it sees some difficulty in doing this, it believes the practical difficulties of segregating these areas of farm administration would be much greater.

Because of the situation outlined, the Task Force believes that occupational health and safety on farms should be planned and administered by an agency that is jointly sponsored by the Ministries of Agriculture and Food, and Labour. By this device, the interests of all the people who do farm work could be encompassed in one policy and program unit. It is recommended:

1. that an agency be established jointly by the Ministries of Agriculture and Food and of Labour that has comprehensive responsibility for developing and administering health and safety programs in agriculture.

The agency mentioned in Recommendation 1 immediately above will be referred to throughout the report as "the Agency" and is to be understood as the government body assuming responsibility for health and safety in agriculture and charged with implementing the recommendations in this report.

CHAPTER TWO

OVERVIEW OF THE NEED FOR PROTECTION

The principal responsibility of the Task Force is to assess the need for protecting farmers, unpaid family workers and hired workers against farm work related health and safety hazards. This chapter reviews general or broad gauge measurements of occupational health and safety experiences on farms. The objective is to determine whether or not these measures indicate if there is a need for greater health and safety protection than currently exists and to evaluate the information available for making such an assessment. The chapter also outlines a general strategy for responding to the conclusions reached.

In assessing the need for protection, the judgements of the Task Force will be based to a major extent on consideration of two indicators of the need. They are:

- the recent fatality, injury and illness experience of farmers and farm workers; and,
- positions and views taken by individuals and farm based organizations in briefs and related discussions with the Task Force.

Injury and Illness Experience

Data that describe the past occupational injury and illness experiences of a defined group of workers is one of the best bases for assessing their work related health and safety situation. Changes within data series, which count fatalities or lost time injuries in a consistent manner and classify them by source, type of injury, age of victim, time of occurrence in work shift and other meaningful variables, can indicate a need for protection or changes in the nature of such a need. Also, if similar data series are available for different groups of workers, carefully made comparisons assist in making a correct assessment. The Task Force has used both fatality and lost time injury data in these ways as one means of observing the state of health and safety protection on Ontario farms. It would have placed greater reliance on this method of analysis had the statistics available to it been of higher quality, more complete and more readily related to labour force and population statistics.

Data Sources

The claims adjudication process of the Workers' Compensation Board is the principal source of work injury and illness data in Ontario. In most industries very high proportions of the workers are hired employees, and as a result the data are based on comprehensive coverage of the work force and accident reporting arrangements that have developed over many decades. In farming the coverage is less complete largely because paid workers make up only 40 per cent of farm employment and the compensation program is not mandatory for self-employed workers. Nevertheless, farm lost time injury and illness statistics are compiled from the Board's allowed claims records by both the Ministry of Labour and the Farm Safety Association. The Association releases an annual report, which classifies the data by several relevant variables.* The report, entitled "Survey of Agricultural Lost Time Injuries," is the only readily available source of such information in Ontario.

The Association also prepares an annual report on farm fatalities.[1] This document contains information drawn from Compensation Board records, police reports of violent deaths, the media and the Association's consultants located across the province. Each fatality is described briefly permitting the user to select those having particular characteristics. For example, child fatalities can be identified and categorized as work- related or not.

The Registrar General of Ontario, the Ontario Ministry of Transportation and Communications, and the Office of the Chief Coroner all compile fatality data. These sources have been used in background work done for the Task Force.[2] In addition, fatalities in the mining and construction industries, recorded respectively by the Mining Health and Safety Branch and the Construction Health and Safety Branch of the Ministry of Labour, have been used to make inter-industry comparisons of fatality experience.

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* In the 1984 report the variables used are month, farm commodity, county, nature of injury, type of injury, source of injury, part of body, and age.

Fatalities as an Indicator of Need

In the four years, 1981 to 1984, the Farm Safety Association reported 181* Ontario farm fatalities. This is an average of 45.25 farm fatalities per year, but not all were directly related to farm work.

The 181 fatalities included 134 that occurred to farmers, members of their families and hired workers while they were doing farm work. Another 18 were accidental deaths of children, 15 years of age or younger, who were not doing farm work when they were killed, but who were being entertained in the farm work process or were playing by themselves in buildings or other farm locations. The remaining 29 fatalities occurred either to farm people on or off the farm while not clearly engaged in farm work or to visitors not employed on a farm. Fatalities counted in this latter category include heart attack victims not actually at work, persons killed in highway or other accidents that were not clearly farm work-related and persons coming to a farm to cut firewood for their own use. This classification of farm fatalities gives some indication of how, and to whom, they occur, and is used in Appendix 2 in comparing the farm experience with those of other industries.

Appendix 2 presents a statistical analysis of fatalities in Ontario farming, mining and construction for the years 1981 to 1984. Figure 2, which is drawn from that analysis, shows that fatality rates in farm work fall roughly in the same range as those of the mining industry and that they are substantially higher than those of construction (the fatality rates determined are shown in numerical form in Exhibit 3 of

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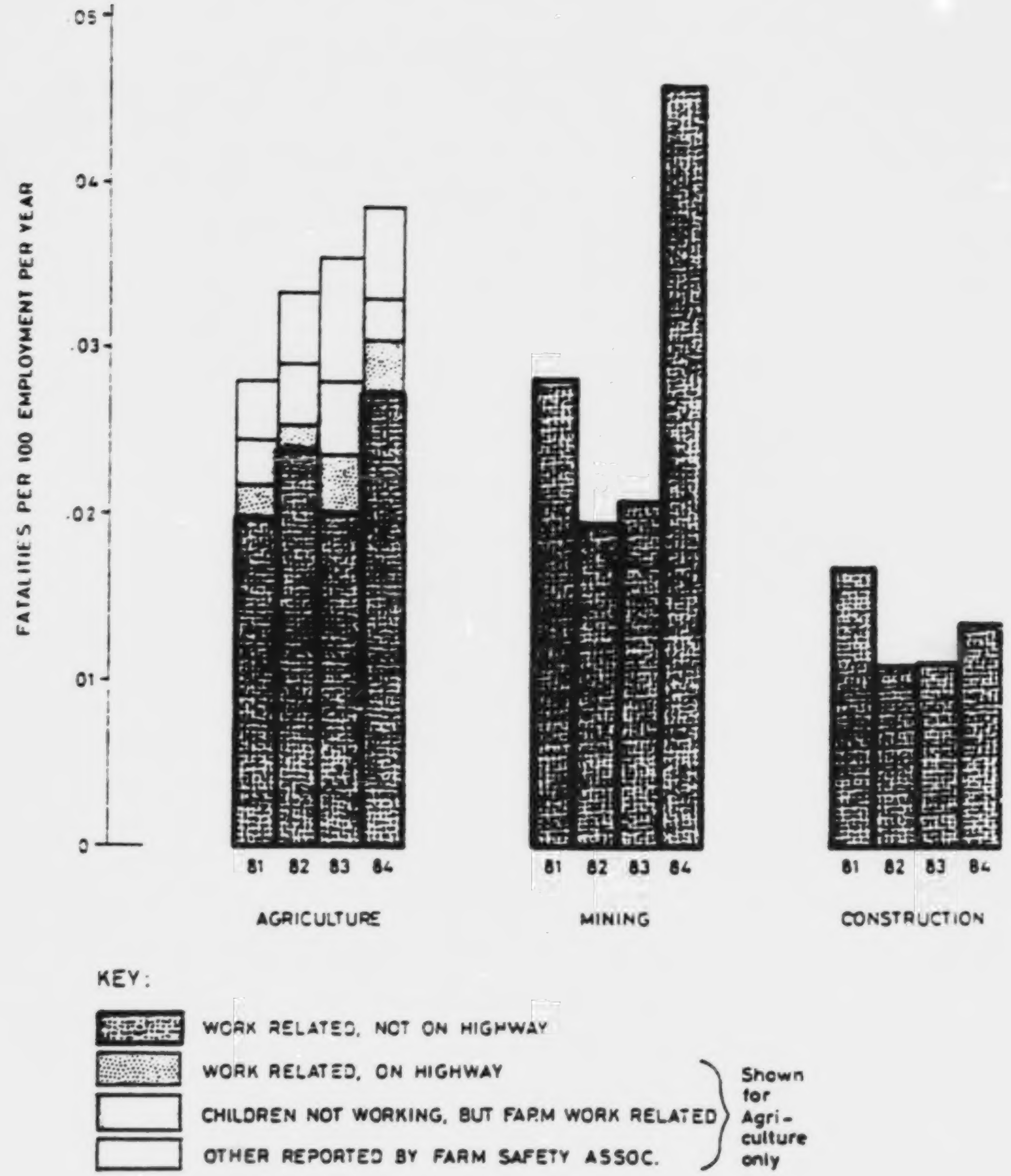
* This number reflects preliminary data for 1984 given the Task Force before the Association had arrived at a final count of 50 fatalities for that year.

Figure 2

COMPARISON OF FATALITY RATES



Source: Appendix 2.

Appendix 2).* Tests of the reliability of the findings indicate that there is no significant difference between the rates found in agriculture and mining. These conclusions support the view that farming is one of the more hazardous industries in which to work.

The most heavily shaded areas of the bars on Figure 2 give a direct comparison of on-farm, mine site and construction site traumatic fatalities. However, the Task Force considers that farmer and farm worker fatalities that occur while doing farm work on highways are as much a part of the farm experience as those that take place on the farm itself. Unfortunately, no data are available on work-related highway deaths of people employed in construction and mining. Also, there are no data from mining and construction with which those on child fatalities in agriculture can be compared.

Seventy-five per cent or more of farm fatalities are associated with machinery.[3] This raises a question of whether or not the burden falls equally on all categories of farm workers or particularly heavily on one of them. During the years 1981 to 1984, the 134 fatalities of people engaged in farm work were distributed between farmers, family members and hired workers, as shown in Table 3. The heavy burden borne by farmers themselves is not surprising. Because of its complexity and cost, the farm owner frequently reserves for himself the responsibility for machinery operation. Second, it was pointed out in the Task Force's hearings that when a task is judged to be dangerous, the farmer is likely to perform it himself. Third, as already mentioned, a high proportion of hired workers is engaged to do repetitive tasks that involve a mininum number of very serious hazards, thus tending to reduce the number of work-related fatalities they incur.

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* Fatality rates for nine major industry divisions including agriculture have been published for the years 1978 to 1982 in the annual reports of Ontario's Advisory Council on Occupational Health and Occupational Safety. For the years 1980, 1981 and 1982 these rates show agriculture in the fifth position behind forestry, mining, construction and transportation, communications and utilities with respect to severity of fatality experience. This is not surprising since the calculation of the agriculture rate is based on a partial count of fatalities (those enumerated through the Workers' Compensation Board's records of claims that cover only hired farm workers and a relatively small number of farmers) and an estimate of workers that is very different from that used in Appendix 1.

Table 3
Farm Fatalities by Share of Farm Employment
1981-1984

	% of Farm Employment	% of Farm Fatalities
Owner/operator	45.5	59.7
Unpaid Family Member	14.5	14.2
Hired Worker	40.0	26.1

Source: Special tabulation of Farm Safety Association data by Task Force staff.

Long-term trends in fatality rates may also have a bearing on the question of need for protection. An effort was made in a background study for the Task Force to establish a trend in farm fatalities over a period of two decades. It reached the following conclusion:

> "The rate of all violent and accidental deaths on farm properties increased from 1959-1960 to 1980 and 1981, whether measured by fatalities per 100,000 of the farm population or per 100,000 person-year equivalents. Agriculture related fatalities (that is, farm work-related) on farm properties increased per 100,000 of farm population and probably increased per 100,000 person-year equivalents."[4]

The incidence of fatalities is an important measure of the need for protection, but the necessity of the risk-taking that results in them may be an equally relevant consideration. The point cannot be more clearly made than by the following, already published, descriptions of farm fatalities:

> "Victim was working alone in barn under the raised bucket of a skid loader. There were no safety supports under the skid loader bucket. The victim was attempting to fix a defective hydraulic system. Victim disconnected two hoses and failed to engage the safety lock. The bucket fell and victim's chest was crushed. Victim died of asphyxia."[5]

> "Victim was riding on a moving bale elevator when victim's foot went under one of the cross carrier bars. Upon getting to the top of the elevator, the carrier bar slipped up over victim's body to shoulders and head, stalling the elevator, causing asphyxiation."[6]

> "Victim entered a steel grain bin, with auger running, to dislodge bridged contents from the walls. Victim fell or was drawn down to the auger where victim was found dead."[7]

Whether the behaviour that brought about these fatalities resulted from work pressure, hurry, lack of understanding, pranks or other causes, is not the point in the assessment being made in this chapter. The real concern is whether or not there is a need for protection from such behaviour. The incidents cited leave little doubt about there being such a need. It is confirmed by the Royal Commission on the Health and Safety of Workers in Mines, which states in its report:

> "While careful design and effective maintenance of the work environment is important, relatively few accidents are the result of technical or physical defects that are independent of the personal act of work. The great majority of accidents arise out of the act of work itself."[8]

Because of the different work environments and degree of formal safety protection present in mines and on farms, the point made would seem to be doubly applicable in farm workplaces. The Task Force sees increasing the level of safety awareness among farmers and farm workers as a matter that is in urgent need of attention.

The foregoing paragraphs illustrate the incidence of fatal accidents and the level of worker awareness of risks. The information presented indicates that there is very substantial room for improvement in both areas. In particular, the comparison of farm fatalities with experience in other industries, the lack of long term improvements in fatality rates and the almost unbelievable level of risk-taking that occurs suggest that there is a major need for greater health and safety protection.

In addition to supporting the need for improved protection, the fatality data produced by the Farm Safety Association and other agencies reveal some areas of uncertainty, particularly with respect to the scope and completeness of coverage and the degree to which the incidents reported are work related. Accordingly, the Task Force recommends:

2. that the approach to fatality data collection already in place be extended to make consistent use of all available sources, for example, the files of the Registrar General and of the Office of the Chief Coroner;

3. that rigorous criteria be established for what fatalities are reported as farm fatalities and that they be classified, perhaps as set out in Appendix 2, with respect to the directness of their relationship to farm work;

4. that every effort be made to maintain a consistent relationship between the fatality data and farm employment and population statistics produced by Statistics Canada; and

5. that the case-by-case description format of the Farm Safety Association's annual report on farm fatalities be retained and that greater public use be made of the report and background information to it as vehicles for accident prevention.

Injuries and Illness as an Indicator of Need

Because lost time injuries and illnesses occur in much greater numbers than fatalities, they would be expected to be a better statistical indicator of occupational health and safety experience. However, for Ontario agriculture the data fail to meet this expectation.

The Province does not have a system that records all the lost time work injuries and illnesses experienced by people engaged in farm work. As already mentioned, compulsory coverage by the Workers' Compensation Act extends only to paid farm workers. Farmers and unpaid members of their families may participate voluntarily in the Workers' Compensation Program, but a relatively small proportion of them do so.* As a consequence, lost time injury and illness data prepared from claims for which compensation has been paid to farm workers gives much less than a complete picture of the work injury and illness experience in Ontario farming. The available data cover substantially less than half of total farm employment.

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* At mid-April, 1985, 3,409 farms carried personal coverage under the Workers' Compensation Act. This number is 13.3 per cent of the 25,629 farms participating in the program at the end of 1984 and 4.1 per cent of the 82,448 census farms enumerated in the 1981 Census of Agriculture. This personal coverage may include the farm operator, his or her spouse, partners, sons and daughters and, on corporate farms, the officers of the company. (Revenue Branch, Workers' Compensation Board, April, 1985.)

The Advisory Council on Occupational Health and Safety publishes in its annual reports the numbers and frequency rates of lost time work injuries (includes illness) compensated by the Workers' Compensation Board. Table 4 shows these frequency rate data for the years 1973 to 1983 for ten major industry divisions. In 1983 agriculture had 40.30 lost time injuries per million man-hours worked, a higher rate than in any of the ten preceding years. Over the eleven year period, the industry moved from having the seventh to the fifth highest injury frequency rate. In each of the last two years reported, the rates have been higher only in forestry and logging, construction, mining, quarries and oil wells, and transportation and communication. The rate for agriculture first surpassed that for manufacturing in 1982, and in 1983 stood almost ten points above it. However, it needs to be kept in mind in making these comparisons that the data for most of the industries shown fluctuate erratically.

Also, there are important qualifications to be considered in placing reliance on the lost time injury rates reported for agriculture in Table 4. Because the data from which the rates are calculated largely reflect the experience of a particular segment of farm employment, they almost certainly are not representative of the overall health and safety experience on farms. The problem arises because of over-representation of hired workers in the sample and under-representation of farmers and farm family workers. These considerations are likely to introduce biases because of differences in the work done by the different categories of workers mentioned. The fatality data, already presented, show significantly higher fatal accident rates for farmers than for hired workers. It seems reasonable to expect that this relationship would extend to the lost time injury experience as well.

In addition, there may be for a number of reasons, greater under-reporting of work injuries and illnesses in farming than in other areas of work. Several factors were noted in briefs and discussions as contributing to this situation. They include:

Table 4

Compensated Work Injury Frequency Rate per Million Man-Hours for Major Industries in Ontario, 1973-1983.

INDUSTRY	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Agriculture	31.29	31.25	28.41	33.81	32.28	33.52	34.84	36.00	36.08	35.81	40.30
Forestry and Logging	107.19	98.75	79.35	70.30	79.05	85.91	79.46	82.39	83.82	74.00	89.84
Mining, Quarries and Oil Wells	49.92	58.93	63.66	68.32	63.65	53.24	47.12	62.12	56.23	45.84	45.44
Manufacturing	33.79	35.18	32.09	34.00	33.90	34.05	37.25	38.87	36.88	29.92	30.51
Construction	60.72	58.07	51.77	64.02	62.11	62.16	65.57	74.88	68.68	49.04	49.55
Transportation and Communication	58.37	55.56	50.93	55.27	55.71	57.16	64.05	65.27	62.05	53.75	53.00
Trade, Wholesale and Retail	18.82	18.73	16.92	18.05	18.09	18.35	18.96	19.15	18.16	16.92	17.29
Services											
Hospital	11.33	11.11	9.67	19.73	19.84	19.88	21.81	23.71	22.76	18.96	19.91
Teaching	8.75	9.41	8.56	9.16	9.23	8.82	9.78	10.43	10.67	7.87	7.20
Other	10.96	10.47	9.36	10.29	10.57	10.61	11.53	12.61	11.01	12.44	13.17
Public Administration	31.13	28.61	27.71	30.43	31.70	31.11	32.32	33.82	31.17	32.78	33.56
Others (Fishing)	51.02	37.53	40.85	33.51	37.49	38.20	24.25	35.70	28.16	31.75	39.20
All Industries (Schedule I)	28.72	28.95	25.73	29.02	28.40	28.07	29.89	31.17	29.37	25.09	25.66

Source: Advisory Council on Occupational Health and Occupational Safety, Seventh Annual Report, April 1, 1984 to March 31, 1985, Appendix C. Toronto. 1985.

- hired employees sometimes are not aware of their rights under the Workers' Compensation Act;

- employers refraining from submitting claims to the Workers' Compensation Board to improve their accident records;

- lack of awareness or unfamiliarity with the claims submission process among farmers who do not employ hired workers regularly;

- casual employment arrangements in which workers do not press for compensation coverage; and

- farmers and permanent farm employees have a strong incentive to work, especially on small farms where limited alternate help is available, with the result that accidents and illnesses that would be reported in other industries may not cause lost time and therefore may not be reported in farming.

Sharp increases in the lost time injury frequency rate would, by themselves, indicate a sharply increasing need for worker health and safety protection in agriculture, especially among hired workers. However, the possibility that there was very substantial under-reporting of lost time injuries in the early years of the application of the Workers' Compensation Act to farming suggests that the changes in the frequency rates may be a result, at least, in part, of reporting changes. Regardless of the cause of the change in the frequency rates, they suggest that farm health and safety performance is not improving and, in this respect, the industry may be losing ground relative to others.

Uncertainty about how well statistics drawn from Workers' Compensation Board records reflect the work injury and illness experience in farming has been a major problem for the Task Force. Its reservations about the data are not a criticism of the Workers' Compensation Board, which does not have a primary responsibility to generate data on accident and illness experience in Ontario. The Board has assisted the Task Force by providing whatever information it had that was relevant to the work to be done.

The Board will remain the only economical and on-going source of farm work injury and illness data. However, for the reasons outlined above, the Task Force believes that survey work should be undertaken to measure the overall work injury and illness experience in agriculture.

Without such a survey, the statistical base for studying the health and safety experience in farm work will remain less meaningful than that currently available in other areas of employment in Ontario. This information deficiency has seriously impaired the ability of the Task Force to bring conclusive information to bear on many of the questions it addressed. Therefore, the Task Force recommends:

6. that survey work be undertaken among farmers, farm family workers and hired farm workers to:

    - describe their work injury and illness experience;

    - describe the occurrence and nature of health and safety hazards in farm work and the extent of exposure to them;

    - relate the injury and illness experience and exposure information to variables that describe the characteristics of farm work, farm workers and their working conditions; and,

    - wherever possible, ensure that the survey information is collected and analysed in ways that permit it to be used in conjunction with existing data sources.

The available numerical data on lost time injuries on farms are of limited assistance in general assessment of the need for health and safety protection. They suffer from the coverage and reporting deficiencies mentioned above. Nevertheless, these data suggest areas of farm health and safety experience that may warrant particular attention. For example, 51.4 per cent of reported lost time farm injuries occur to people of 25 years of age or less.[9] Unfortunately, the proportion of workers in this age group to total farm employment is not known and, for that reason, it is not possible to determine the seriousness of their accident experience relative to that of older workers. Similarly, nurseries, landscape, tobacco, and fruit and vegetable farms consistently account for more than 50 per cent of lost time accidents in agriculture. These types of farm are known to be large employers of hired labour but again it is impossible to determine the severity of their accident experience compared to that of other components of the industry and whether or not there are differences in accident frequencies between hired and own-account workers. Other examples of interpretation problems could be cited but in each instance they have a greater bearing on defining particular aspects of the need for protection than on the overall assessment of it.

Failure to maintain comparability of data classification systems and rigorous definition and control of inputs into injury and illness data series renders the existing statistical information less useful than it might be in describing the occupational health and safety experience of farm workers. The Task Force sees an immediate need for more flexible statistical data on farm health and safety experience and recommends that:

7. the agencies currently generating information on farm health and safety experience and those preparing statistics from that information work together to ensure that they use consistent definitions and systems of classification and that their output is compatible with other major statistical series, such as farm employment data prepared by Statistics Canada.

Health Information

No part of its assignment has given the Task Force more difficulty than that of obtaining information on the occupational health of farmers and farm workers in Ontario. Statistical data that give insights into their health experiences are simply not available. Consequently, a review of recent literature that discusses farm workers' health was undertaken as a means of identifying priority concerns.

A review[10] prepared by the Occupational Health Program of McMaster University draws attention to a substantial number of farm work-related health problems that have been studied in Ontario or in other areas where farming has major characteristics in common with the industry in this province. This approach permitted the selection of potential health related issues that seem to deserve priority attention. Among those noted were forms of cancer that are associated with certain types of farming, extensive exposure to sunlight and the use of particular chemicals. Also, lung diseases caused by dusts, spores and gases and infectious diseases communicated to humans by animals, come in for extended attention. In all, nine types of health problems are mentioned as being likely to occur in Ontario. They are cancer, reproductive hazards, skin disorders, neurological diseases, lung diseases, infectious diseases, noise, musculo skeletal diseases and stress and they are discussed individually in Appendix 3 which is an extract from the review study. However, it was not possible in any one of these cases to relate the problem with any degree of certainty to the experience of people doing farm work in this province.

Judging from the amount of attention occupational illnesses received in briefs to the Task Force, they are not seen as a major concern by farmers and farm families. Some seasonal hired workers have a different view. Briefs focusing on the interests of these people expressed anxiety about proper sanitation and exposure to pesticides, but only a handful of actual instances of adverse health experiences was cited.

In order to assess health protection requirements properly and to focus programs effectively both the McMaster study and the Task Force agree that better information must be generated on the occupational health of farmers and farm workers. Recommendation 5 has indicated the necessity for obtaining this information by means of surveys. In addition, the Task Force agrees with the suggestion made in the McMaster study that existing arrangements be used to collect more extensive and compatible health data relating to agricultural work.

Slight modifications in the information already generated by such agencies as the Hospital Medical Records Institute, Ontario Hospital Insurance Plan, Poison Control Centres and others could radically improve the availability of information on the health of farm workers. One of the major deficiencies is lack of information on the patient's occupation. Others are failure to include data on symptoms reported or to specify the source of a problem. Because survey data will never provide a continuing picture of health experiences and because the mechanisms are already in place whereby such a picture could be obtained, the Task Force recommends:

8. that a health data collection system using existing data generating sources, such as the Hospital Medical Records Institute, Ontario Hospital Insurance Plan, Poison Control Centres, Workers' Compensation Board, Ontario Ministry of Health and perhaps others, be established to record and analyse adverse health effects experienced by farmers and farm workers.

Industry Views of Need

To provide farmers, workers and others interested with opportunities to express their views, the Task Force held public hearings across the province and made many other contacts with the farm community .In this way it obtained extensive comment from the people doing farm work in Ontario or their recognized representatives on the need for greater health and safety protection than they already have.

Each of the seventy-six written briefs submitted to the Task Force recognized occupational health and safety as an aspect of farm work that requires attention. Almost all the briefs identified specific areas of risk and advocated action to limit them. Further, the major thrust of discussion with persons who made formal presentations and those who intervened informally in the hearings favoured measures to improve on the health and safety performance in the industry. Frequently, they extended this concern to include that any protective measures proposed recognize the characteristics of farming.

An impression of the representativeness of the formal briefs can be obtained by observing the index in Appendix 1. Federations, commodity associations, marketing boards and county safety associations presented more than a third of the total. These agencies made it clear that they spoke for their members, and there was considerable evidence of consultation having occurred in the course of developing the positions put forward. For example, the Ontario Federation of Agriculture noted that its membership of 25,000 individual farmers and at least twenty-two major boards and associations endorsed the recommendations it made. In turn, these organizations cited their own memberships to indicate the support for their suggestions. The safety associations emphasized their regional or local roots.

Roughly, another third of the briefs came from organizations with interests in such special aspects of farming as labour supply, worker rights and protection, the role of women in farming, health and safety information and the safety of products used on the farm. Most of these organizations do not represent large memberships, but they spoke from experience in servicing, studying or working in the industry. Their inputs gave the Task Force insights into particular aspects of farm health and safety and placed emphasis on the social dimensions of farm work.

The remaining briefs were from nineteen individuals and three corporate farms. They brought a highly useful first hand perspective to the discussions. Their contributions effectively linked health and safety issues to the day-to-day performance of farm tasks. A number of the individual submissions demonstrated the intense concern about work safety that derives from being closely associated with serious occupational accidents or illness.

The industry briefs and related discussions dealt with both identification of health and safety hazards associated with farm work and with what preventive and protective measures would be most effective in countering these hazards. The comments ranged from such general areas of concern, as, machinery and education, to highly specific ones, such as the location of on/off switches on tractors and the need for training in the use of orchard ladders. Other topics of general concern were the impact of more rigorous health and safety requirements on farm costs, the fair distribution of the funding burden of protective programs and infringement on the traditional independence of farming.

There is wide agreement in the industry about health and safety priorities. The design and use of machinery is in first place by a very wide margin with the briefs mentioning many specific features of machines and their operation that require attention. After machinery, perhaps the next most commonly noted concern is farm chemicals. It encompasses both acute exposures and uncertainty about the long term health effects of currently accepted levels of exposure. Also, non-observance of recommended safety procedures for using chemicals is an important issue. Structures are not generally recognized as major contributors to health and safety problems, but silos and manure handling systems have a priority well above that for the category as a whole. Neither are animals, plants and other features of farms sources of general concern, although specific aspects of them may require substantial attention. Problem areas of a different nature are working conditions and stress. Both are viewed as factors that contribute to the occurrence of work injuries and, possibly, illness. They were both brought forcefully to the attention of the Task Force as being inherent in farming because of the biological processes and uncontrolled environments with which farmers and farm workers must deal.

There is far less agreement in the industry about what measures are most likely to forward health and safety protection in farming than there is on the priority of hazards requiring attention. The extensive endorsement of education as the vehicle that will best serve this purpose is found primarily in briefs of the federations, commodity associations, and marketing boards. On the other hand, a significant number of submissions scarcely recognize this approach. Instead, they suggest heavy reliance on comprehensive health and safety legislation. To some degree, this difference of opinion reflects a farmer as opposed to a hired worker orientation, but that distinction is not a consistent one. A substantial number of the farm organizations see a need for some legislation, and inputs from advocacy organizations and employees recognize the value of education in the promotion of health and safety. There was limited elaboration of the content and nature of the education proposed. Approaches such as consultative services, which are widely used in the United States, voluntary audits, industry monitoring and guidelines were not explored.

The foregoing outline of briefs and other communications to the Task Force leave little doubt about the industry's recognition of work health and safety issues and its disposition to correct them. A strong preference that farmers be left as free as possible to arrange their own protective measures is expressed, but, at the same time, there is recognition that voluntary action alone may not provide the forward thrust needed.

Conclusion

While the measurements attempted in this chapter are not as precise as might be desired, they leave little doubt about there being a need for greater health and safety protection in farm work. The fatality experience is, without question, the most convincing evidence of this need. Not only are farm fatalities as high as or higher than those in industries traditionally considered among the most hazardous, but there is evidence that extreme disregard of risk is an important factor in bringing them about. The fact that child victims form a substantial part of the total strongly underlines the need for immediate action to reduce farm fatalities. Because the lost time injuries data do not reflect the experience of all of those employed in farming, they do not give as clear an indication as the Task Force would wish to have of the nature and extent of this experience. Nevertheless, the lost time injury data that are available suggests that there is room for improvement. The fact that both of these statistical assessments are strongly supported by the views expressed to the Task Force by the farm community confirms the conclusion reached above. Based on this evidence and the insights of its members, the Task Force believes there is an urgent need to develop greater occupational health and safety protection in farming and that the matter needs no further debate at this general level.

The appropriate health and safety objective for the farming community would be continuing improvement in work-related injuries and illness experience. The information available to the Task Force indicates that there would be wide endorsement of this objective. A strategy that would serve it and accommodate the special characteristics of farming is as follows:

- institute ongoing monitoring of occupational health and safety experience on farms for the purpose of identifying and understanding priority health and safety concerns;
- put in place organizational arrangements and programs to correct or alleviate these priority concerns; and,
- use, as appropriate, any one or combination of preventive and protective measures from among those available for improving occupational health and safety.

The objective implies setting priorities, and the strategy establishes the means of doing this and of taking action on them. The approach should ensure that high risk situations are recognized and, insofar as possible, resolved.

The remainder of this report considers specific occupational health and safety problems and recommends action on them. Many of the topics discussed are matters of concern in all types of farming, but others are specific to individual commodity groups. To make the task manageable, the topics are classified under four major headings - machinery, structures, farm chemicals, and human factors. It is important to recognize that the discussions will not cover every farm health and safety issue that deserves attention and that those that are mentioned are considered in varying degrees of detail. This variation reflects the importance that both the Task Force and the farm community assigned to the topics in question and the availability of information on them.

In addition, throughout the remainder of the report the Task Force will be recommending specific courses of action. The discussion in this chapter has already indicated that the ways in which health and safety protection is delivered on farms raise more questions than whether or not there is a need for greater protection. The central issue is whether or not health and safety performance can be improved significantly by relying on education alone or if it needs to be supplemented by regulation. Other devices for delivering health and safety programs, such as voluntary monitoring and industry assumption of responsibility for ensuring compliance with guidelines or recognized standards, are also available. The Task Force has concluded that a mix of these various measures is most appropriate to the present situation in Ontario, and it states in the recommendations that appear in the succeeding chapters whether or not it considers legislation, education or some other device appropriate to particular problem situations. A more complete discussion of the conditions in which education and legislation may be useful in protecting farm workers against health and safety hazards appears in the final chapter of the report.

On the second major theme of this chapter, that is, the need for information describing the occupational health and safety experience of farmers and farm workers, the Task Force wishes to emphasize the importance of improvements being made in the quality and availability of data. The inadequacy of the existing data has seriously limited the analysis it was possible to do in this report. Some concerns noted, especially those relating to health, are largely based on information generated in other jurisdictions and an anxiety that is created by lack of information on Ontario experience. The farm community is concerned that health and safety policy and programs in the industry have a more solid foundation. If only limited long-range planning were done by government agencies having health and safety responsibilites in this area, there is evidence that much of the needed information could be produced from existing sources. Accordingly, the Task Force recommends:

9. that the Agency, in cooperation with the Ministries of Labour and of Agriculture and Food, put a high priority on developing an information base that will permit meaningful analysis of farm occupational health and safety issues.

CHAPTER THREE

MACHINERY

By 1961 a significant level of mechanization had been achieved on Ontario farms. In the preceding decade the number of trucks, tractors and combines increased by 50 per cent. Since that date mechanization has continued but at a somewhat slower pace.[1]

The association between the use of machinery on farms and safety performance was recognized in the Ontario Ministry of Agriculture at least as early as the latter half of the 1950s. This resulted in an exploration of the problem, which culminated in the Department's survey of farm accidents of 1959-1960.[2] It confirmed the importance of the rapid increase in the use of farm machinery in the years following World War II as a major factor in farm accidents.

Figure 3 analyses by source the 134 farm work related fatalities and the 18 farm fatalities that involved children not doing farm work in the years 1981 to 1984. Roughly three-quarters of the accidents in each of these two categories were machinery-related and, in both categories, tractors and tractor-drawn equipment were the source of the majority of the accidental deaths recorded. Similar analysis of the data for the years 1979 to 1982 [3] leaves no doubt about the important role of machinery as a causal factor in the most severe farm accidents in the province.*

Lost time injury data drawn from the records of claims submitted to the Workers' Compensation Board indicate that in the period 1978 to 1982, 26.2 per cent of such injuries were associated with farm machinery. In 1983 and 1984 these proportions stood at 21.3 and 21.1 per cent respectively. The marked difference in the fatality and lost time injury

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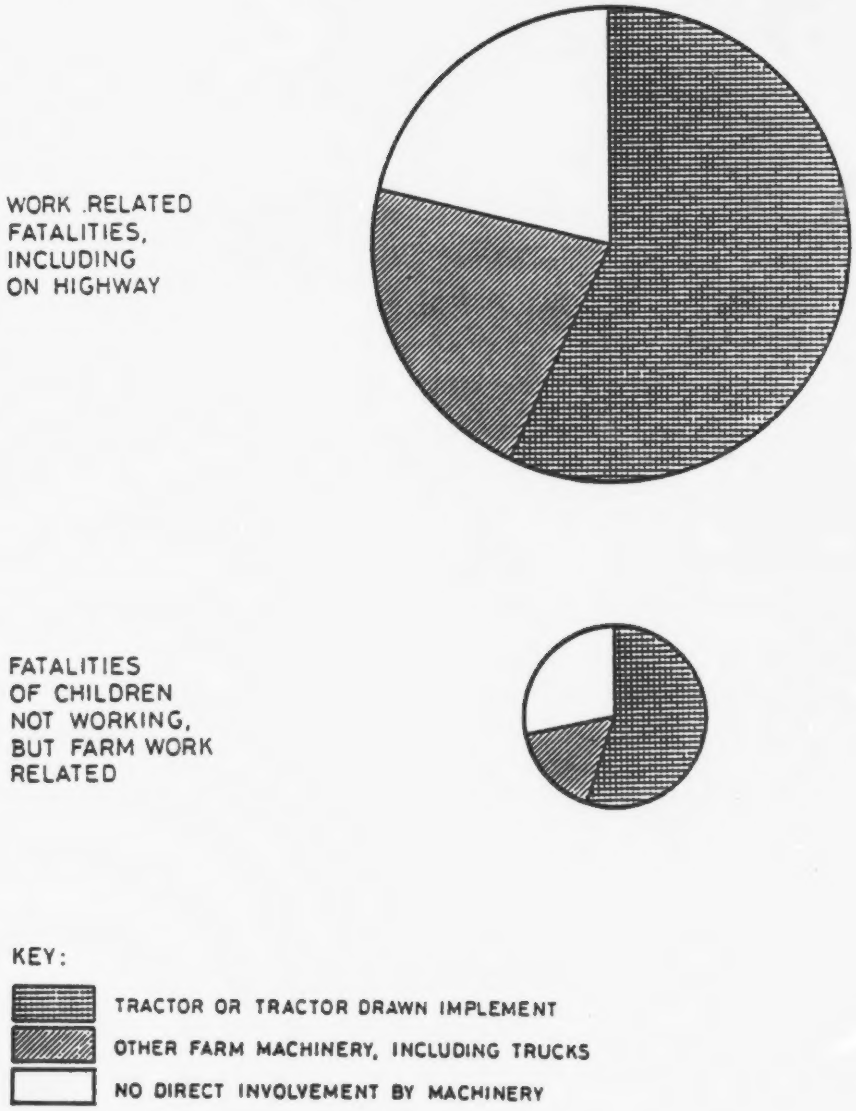
* For further analysis of Ontario farm fatalities by age, sex of victim and other variables, see the Task Force's Background Paper #1, A Structure of Ontario Agriculture as Related to Health and Safety, by Earl Haslett, pages 68 to 88.

Figure 3

SOURCES OF FATALITIES



Source: Appendix 2

experience is almost certainly accounted for by the fact that the data on fatalities covers all people who work on farms, while that on lost time injuries report mainly on the experience of hired workers.*

The importance of machinery as a causal factor in farm accidents is confirmed in the experience of other jurisdictions, such as the United States and Western Europe[4]. For example, the National Safety Council reported that in 1982, machinery, tractors, trucks and other vehicles were involved in 71.4 per cent of farm fatalities and in 39.6 per cent of all farm injuries reported for that year in 31 states having 60 per cent of the farms and ranches in the United States.[5]

In light of the above, the Task Force believes that in order to improve occupational health and safety on Ontario farms that the highest priority should be given to resolving the safety problems arising from the use of machinery. Machinery hazards are discussed in detail in terms of farm tractors, other machinery, shielding, maintenance and communication and standards.

Farm Tractors

During the past forty years continued development of power, speed and efficiency, has made the tractor a basic and versatile energy source on practically all Ontario farms. In 1961 there were 1.2 tractors per farm, and this increased to 2.2 in 1981.[6] There is no doubt about the importance of the tractor to Ontario agriculture, and there is no doubt about the dangers that surround its use, not only to operators but also to other workers and farm children.

Between 1979 and 1982 60.5 per cent of work-related farm fatalities were directly related to tractors.[7] The Farm Safety Association estimates that 60 per cent of tractor-related fatalities are the result of rollovers.[8]

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* For a more complete discussion of the lost time injury data see Chapter Two, page 42.

Statistics released by the Ontario Farm Safety Association show that tractors were the source of 25 of the 35 child fatalities* associated with farm machinery that occurred between 1975 and 1981. This was 39 per cent of all child fatalities reported in farming during the seven year period. In 12 of the 25 cases the child killed was an extra rider, in 7 the tractor operator, in 4 a bystander, and in 2 the fatality involved the power take-off. Farm fatality information for the three years that have elapsed since the period covered by the analysis indicates that the activities noted continue to be those that give rise to tractor related child fatalities on farms.

In the five years between 1978 and 1982 the Workers' Compensation Board approved and classified by source 11,642 claims for lost time injuries under its agricultural rate numbers.[9] Of these claims, only 332 cited a tractor as the source of injury, a number that represents 2.8 per cent of the total shown. As discussed in Chapter Two, these data underestimate the total number of accidents that occur on Ontario farms to farmers and farm family members as opposed to hired workers. Viewed in conjunction with fatality data, they indicate that tractor accidents may frequently be particularly severe. This conclusion tends to be supported by the National Safety Council data already cited for farming in the United States and by experience in Sweden.

During the Task Force hearings many views were expressed about tractor design and how it might be improved to provide greater safety. Among the matters most frequently mentioned were:

- rollover protective structures;
- back-up warning beepers to counteract poor back-up visibility;
- interlocking switches that shut off the tractor when the operator leaves the seat, opens the cab door or removes shielding on hazardous operating parts;
- permanent shielding which cannot be left off the tractor but which is hinged or otherwise easily opened for quick access to areas to be maintained;

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* Victims 15 years of age or less.

- a switch located at the rear of the tractor to disengage the power take-off; and,
- standardization of the locations, shapes and colours of operating controls.

Rollover Protective Structures (ROPS)

Tractors are designed with large wheels and a high ground clearance so that they can work easily over rough ground and growing crops. This gives the tractor a high centre of gravity, which can affect its stability, particularly on sloping surfaces and at high speeds. The chief causes of tractor rollovers as stated by the Farm Safety Association are:

- driving too fast for conditions;
- striking surface irregularities such as rocks, stumps and holes;
- running into ditches;
- hitching high for extra traction;
- driving on steep slopes;
- improper operation of front-end loaders;
- large round bales and other overweight loads which greatly increase overturn potential; and,
- lack of individual sense of responsibility in operating tractors safely within those conditions present.

Because of costs and the long life of the equipment, little can be done in the short term toward redesigning farm tractors to eliminate their tendancy to rollover. However, rollover protection devices that include both rollover bars and fully enclosed safety cabs have been shown to be effective in reducing injuries to operators who must work with these high risk machines.

For three decades engineers and health and safety authorities have recognized that the characteristics of the typical farm tractor necessitate a form of operator protection physically capable of supporting the weight of the tractor and of protecting the driver in the event of a rollover. To be effective, it is essential that such arrangements be used in conjunction with seat belts. ROPS installations without seat belts are ineffective in saving the operator from being crushed under an overturning tractor.

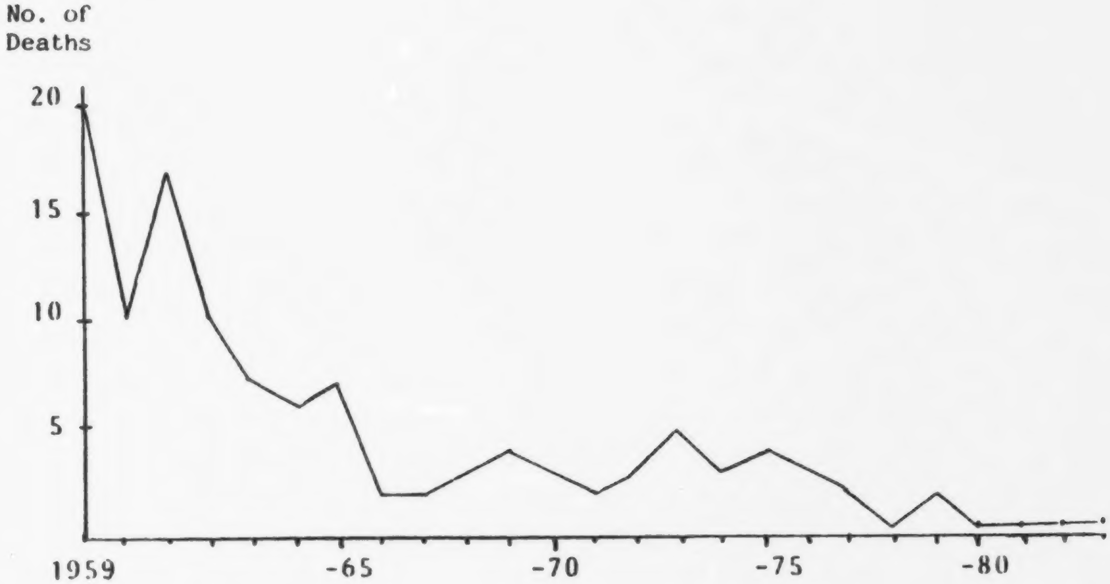
Experience in other countries demonstrates the benefits of rollover protection. Sweden required that all new tractors delivered after June 30, 1959 should be equipped with a safety cab or bar, and made them compulsory for all employee operated tractors effective October 1, 1965. This change brought about a dramatic drop from between 10 and 20 fatalities per 100,000 tractors a year between 1959 and 1962 to two or fewer fatalities per 100,000 tractors in the late 1970s and early 1980s[10] (see Figure 4). The introduction of rollover protection in the Federal Republic of Germany during the 1970s reduced agricultural tractor rollover fatalities from 181 in 1969 and 179 in 1970 to 34 in 1978, 35 in 1979 and 21 in 1980. The report notes that there was some decline in farm population in the period covered by the data but indicates that the safety measures were largely responsible for the sharp decrease in tractor rollover fatalities.[11] Relying on the recommendations of the American Society of Agricultural Engineers, Nebraska actively promoted the use of ROPS on farm tractors. During the 10 years 1970 to 1979, the State had 130 farm fatalities resulting from tractor overturns but none of these involved tractors equipped with ROPS. During that decade rollover protective structures helped the State to reduce farm tractor fatalities from 20 to 13 per year.[12]

The United States Occupational Safety and Health Administration (OSHA) made ROPS mandatory on farm tractors manufactured after October 25, 1976. The requirement was for employee operated tractors and was changed during the first term of the Reagan administration to apply on farms only where there are eleven or more hired workers. Nevertheless, the requirement is in place on larger farms in all states. Also, a number of other countries, including Great Britain and the Netherlands, have legislated the use of ROPS on tractors and other agricultural machinery.

Agricultural industry representatives have recommended that Ontario require the use of ROPS on farm tractors. In 1977 a brief submitted to the Minister of Labour by the Ontario Farm Safety Association, the Ontario Fruit and Vegetable Growers' Association, and the Ontario

Figure 4

Number of Known Deaths Due to Tractor Overturning Accidents, Sideways or Rearwards, Per 100,000 Tractors in Sweden



Source: Swedish Embassy, Washington, D.C.

Federation of Agriculture recommended that regulations dealing with: (a) protective structures for tractor operators, (b) guarding and shielding of farm equipment, and (c) personal protective equipment, be developed. (See Appendix 4) However, "farming operations" were excluded from the coverage of the Occupational Health and Safety Act when it passed the legislature in 1978. As a consequence, the suggested regulations have not been put in place because of a lack of statutory authority for them.

However, ROPS devices are required in some other high risk Ontario industries. They are mandatory on logging equipment,[13] and on earth moving machines and tractors used in open pit mines and on the surface in other mines. ROPS are not required on a tractor used primarily underground or on a "front-end loader, bulldozer or tractor that is not factory equipped with adaptors to accept a rollover protective structure and that was manufactured prior to 1980."[14] A rollover protective device utilized in mining in Ontario must meet design and test standards set out by the Society of Automotive Engineers or the Canadian Standards Association.

There is strong evidence from the fatality data presented, from the views expressed in briefs to the Task Force and in the position taken by the industry in 1977 that ROPS devices are needed in Ontario farming. The use of ROPS, as documented in other jurisdictions, reduces fatalities and injuries resulting from tractor rollovers on farms. There is significant promise that adopting such legislation will reap similar benefits here in Ontario. An effective ROPS program has the potential for reducing the total number of farm tractor fatalities in Ontario by more than one-half. Therefore, the Task Force strongly endorses the use of ROPS legislation in Ontario and recommends:

10. that approved roll-over protective structures (ROPS) and seat belts be made mandatory on all new tractors used in farming from the earliest date such legislation can be put in place and that only essential exceptions to these requirements be worked out by the Agency responsible for health and safety in agriculture with representatives of the industry;

11. that a government funded program be developed to assist farmers with the cost of installing ROPS on tractors they now own and that are not so equipped; that manufacturer approved ROPS or designs tested

> and certified by the Canadian Standards Association be used for this purpose; and that the retrofitting program be completed by a date to be specified in legislation.

With respect to the exceptions possible under Recommendation No.10, it is suggested that these be strictly limited to orchard tractors and tractors that are used only in stables or other areas where ceiling heights make rollover protection impractical. In addition, the Task Force believes that the farm community should be alerted through the media and training programs to the positive aspects of using ROPS devices on tractors and that the negative safety experience of not using ROPS be addressed clearly in the related published and instructional materials. A general recommendation relating to this and other awareness programs is made later in this chapter.

Other Tractor Hazards

After rollovers, the major hazards associated with tractors are carrying passengers, running a tractor without an operator at the controls and poor backup visibility. The Task Force believes that these hazards also require immediate attention.

Power Cut-Off

It is common practice on farms for tractors to be left running without the operator being in the driver's seat. This often occurs when the operator has to clean, adjust or repair machinery that is powered or towed by the tractor. That many injuries result from this practice is documented by the Farm Safety Association fatality data. Operating manuals and safety warning stickers invariably state the need to shut off the power before servicing farm machinery but many operators are either unaware of these instructions or are careless of their own safety. A solution to the problem would be to design interlocking switches that automatically shut off the tractor or disengage the power take-off when the operator leaves the tractor seat. Such a device could be activated by the seat itself, by opening the tractor cab door and by removing shielding from a hazardous component of the machinery used.

The Task Force recommends:

> 12. that interlocking safety cut-off switches be mandatory on farm tractors and other self-propelled farm equipment offered for sale in Ontario after a date to be specified in legislation.

Some farm operations require power to be taken from a stationary tractor while the operator monitors or participates in the work being done. These activities may include mobile feed mixing and transferring feedstuffs from one container to another. To facilitate such operations interlocking switch mechanisms would have to be designed so that they can be deactivated when the tractor is supplying power to stationary equipment.

Many tractor power take-off spindles or drives are engaged or disengaged from within the cab or operator's platform. In the event of an emergency such as the operator becoming entangled in the spindle, the likelihood of him reaching a PTO shut-off in that location is extremely slight. If an emergency shut-off switch could be located near the driving mechanism, a person who becomes entangled in it would have at least some chance of saving himself. While any worker contact with a moving spindle is likely to be damaging, death or severe injury may be averted if the power to it can be disengaged quickly. The Task Force has noted the concern of farmers and farm organizations about this matter and recommends:

> 13. that an emergency power take-off (PTO) shut-off switch be so located on new farm tractors as to lend itself to being easily reached in emergency situations, and that farmers be encouraged to install such shut-off switches wherever it is practical to do so on existing equipment.

Tractor Passengers

A large majority of Ontario farm tractors are designed to carry only one person, the operator. Nevertheless, farmers have devised ways of transporting one or more passengers on them. The practice concerns the Task Force because it is clearly unsafe. As already noted, almost half the tractor-related child fatalities on farms occur to extra riders, and the Farm Safety Association data show that fatalities arising from this cause occur to adult passengers as well.

There are times in the normal course of farm work when it is convenient or necessary for a passenger to accompany the tractor operator. Bringing equipment back from work areas and training a new operator are among these occasions. Despite such considerations, there are strong differences of opinion in the farm community about carrying tractor passengers. Some briefs favour an absolute ban on the practice, while others are of the view that the practice cannot be prevented.

While the Task Force endorses the view that no passengers should be carried on farm tractors, it recognizes that the practice of carrying them is exceptionally difficult to control. Nevertheless, the Task Force takes the position that the only people who ride on farm tractors should be those workers directly responsible for operating them. The Task Force believes that the Agency, along with commodity groups and others who are interested, should mount a high profile program to ensure farm community awareness of the toll in fatalities and serious accidents that results from carrying passengers on farm tractors and that parents in particular be made aware of the dangers of this practice.

Warning Beepers

As machinery becomes larger it tends to obstruct the operator's view of the immediate vicinity, especially to the rear. Farm Safety Association records cite a number of fatalities each year in which machinery being operated in reverse gear crushes persons, notably children, who are unaware of the intended movement. These events caused many of the people appearing before the Task Force to ask that warning devices be installed on tractors, combines, trucks and other self-propelled farm machines. Special beepers are needed on any farm vehicle where the operator's visibility is hindered by the design of the machine itself or by the equipment attached to it. The Task Force supports the view that warning beepers could be a life saving device on tractors and other machinery and that they can be installed at rather limited cost. Therefore, it recommends :

14. that automatic beepers, appropriate to the machine in question, be made mandatory on all new self-propelled farm equipment purchased after a date to be specified in legislation and that farmers be encouraged to equip machinery already in use with similar devices.

Standardization

There is a self-evident logic from a safety perspective for standardizing the operating controls on the different makes and models of tractors. Since even the most basic controls are located and identified differently on the tractor lines available in Ontario, it is easy to understand why the wrong one could be activated in stressful moments. This argument for standarization applies most urgently to starter switches, throttles, shut-off switches, power take-off controls, hydraulic controls and remote light plugs.

The problems created by radically different layouts and designs of tractor controls are a major concern in the farming community. Control location, identification (graphics and colour) and method of operation are all aspects of tractor design that must be considered. The significance of the problem is confirmed by the fact that the International Labour Organization and the International Organization for Standardization, both of Geneva, have recommended common colours, graphics and positions for tractor controls. The American Society of Agricultural Engineers (ASAE) has also endorsed such standardization. Agricultural health and safety would be advanced if the tractor manufacturers accept standardization of controls as a target for improvement. Organizations that can speak for farm people should communicate their concerns in this area to the makers and distributors of all major tractor lines used in Ontario. The Task Force recommends:

> 15. that the Agency, or the organization selected under Recommendation 22, place a high priority on initiating a program with the tractor manufacturers to promote standardization of the colour, graphics, location and operation of the basic operating controls and the location and design of remote light plugs on all farm tractors sold in Ontario.

Other Machinery

Ontario farmers and hired farm workers use dozens of machines other than tractors. Most of these are mobile and used mainly in fields and other crop production areas, such as, greenhouses. A large majority of these machines are powered by tractors, but some, notably combines, corn pickers and forage harvesters, may have their own power sources. In addition, a substantial number of farm machines are in fixed installations, or have limited mobility, in barns, silos and other structures. These are likely to be powered by a stationary tractor or by electricity. Each machine contains a mechanism for carrying out a particular farming operation, such as tilling the soil, planting, cultivating or harvesting crops and transporting, handling and processing produce and animal and crop residues.

Figure 3 (page 56) shows that machines other than tractors and tractor-drawn implements are the second major source of work-related fatalities on Ontario farms. Slightly less than a quarter of the fatalities recorded in the industry in the years 1981 to 1984 involved machinery not associated with tractors. In considering this statistic it is important to keep in mind that many of the fatalities classified in Figure 3 as "Tractor or Tractor-Drawn Implement" involved machinery other than tractors. An estimate made for the Task Force indicates that approximately 50 per cent of tractor-related fatalities occur where a tractor is working in combination with another piece of equipment.[15]

With respect to lost time work injuries, machinery excluding tractors was the source cited for 23 per cent of these accidents occurring to hired farm workers and some farmers in the five year period ending in 1982. This figure is obtained by adding the injuries attributed to the categories "Other Machinery", "Truck", "Wagon", "Primer", "Elevator", "Licensed Vehicle", "Auger" and "Harvester" in Table 5, which shows the source of lost time injuries compensated by the Workers' Compensation Board. This information in conjunction with the data on fatalities indicates that there is a need to direct accident prevention measures towards the use of these machines.

Hazardous features of most of this machinery and equipment are identified in the study, "Farm Machinery Industry and Farm Safety" prepared for the Task Force.[16] The authors of this paper developed "hazardousness" ratings for seventy-six machines used in grain, tobacco, and fruit and vegetable farming in Ontario. While the list does not include some specialized machines, it mentions practically all of those in common use in farming. The ratings made are "qualitative" and "impressionistic", that is, they are "based on the collective judgement of

Table 5

Number of Lost Time Injuries in a Five Year Period, 1978 to 1982, Ontario, By Source of Injury and Farm Enterprise

Farm Enterprise	Source of Injury																					Total	
	Inanimate Object	Vegetation	Other Machinery	Ground or Working Surface	Animal	Weather	Non-Mechanical	Truck	Movement over Exertion	Tractor	Wagon	Primer	Elevator	Ladder	Tobacco	Licensed Vehicle	P.T.O.	Auger	Harvester	Chemical	Other	Number	Proportion
										- number -												no.	percent
Nursery and Landscape	665	504	380	184	11	70	125	144	75	61	29	-	6	8	-	14	3	5	9	4	187	2484	21.3
Tobacco	474	281	213	214	2	75	31	60	74	74	106	229	43	4	95	12	3	-	12	1	201	2404	20.7
Fruit and Vegetable	372	294	182	80	1	61	103	63	52	57	45	-	11	56	-	6	11	3	12	5	71	1485	12.7
Mushroom	252	69	72	124	0	55	26	17	14	4	8	-	-	16	-	29	-	2	-	-	51	739	6.3
Greenhouses	204	92	27	35	1	23	18	20	28	7	14	-	-	-	-	1	-	-	-	5	48	523	4.5
Cash Crop	34	13	46	18	1	16	6	5	12	19	8	-	7	2	-	3	7	8	11	2	33	251	2.2
Sub-Total	2201	1253	920	655	16	300	309	309	255	222	210	229	67	86	95	65	24	18	44	17	591	7886	67.7
Dairy	172	77	132	82	240	69	29	22	26	46	22	-	29	9	-	4	29	18	11	3	105	1125	9.7
Poultry	201	39	61	53	65	36	26	19	21	11	4	-	4	2	-	2	3	6	-	3	90	646	5.5
Horses	49	27	21	14	245	8	5	4	11	4	11	-	2	-	-	-	-	1	-	-	12	414	3.6
Beef	84	38	81	41	86	16	11	20	6	18	18	-	5	3	-	2	12	10	5	2	55	513	4.4
Pork	49	8	24	17	55	4	13	0	2	-	1	-	1	1	-	-	3	6	-	-	15	199	1.7
Sub-Total	555	189	319	207	691	133	84	65	66	79	56	-	41	15	-	8	47	41	16	8	277	2897	24.9
Drainage	100	10	42	23	0	13	13	8	9	5	8	-	2	-	-	2	-	1	-	1	30	267	2.3
Other	143	72	106	40	13	17	22	20	8	26	19	-	12	1	-	5	9	10	4	1	64	592	5.1
Total - Number	2999	1524	1387	925	720	463	428	402	338	332	293	229	122	102	95	80	80	70	64	27	962	11642 *	
Total - Percent	25.8	13.1	11.9	8.0	6.2	4.0	3.7	3.5	2.9	2.8	2.5	2.0	1.0	.9	.8	.7	.7	.6	.5	.2	8.2		100.0

Source: Farm Safety Association Inc., Survey of Agricultural Lost Time Injuries, Annual, 1978 - 1982.

* Deletion of injuries not classifiable by variables shown reduced the total below the 12,209 reported between 1978 and 1982.

experienced and, presumably, unbiased individuals." The ratings were assigned by assessing "equipment design, configuration and construction" but did not take accident experience into account. They fall into a scale of 0 to 10 with 10 indicating the maximum hazard. Further details of the ratings are given in Appendix 5 (Chapter 4 of the Background Paper).

Characteristics of farm machinery that are associated with lost time injuries and fatalities have to do with speed, visibility, ease of manoeuver, servicing requirements, exposure of moving parts, the presence of grabbing and cutting mechanisms, stability and the necessity for workers to work close to moving parts. Brief descriptions of the hazardous features of a few machines illustrate some of these.

- Forage harvesters, (rated 9 in the Background Study), are PTO or self powered and are usually operated in tandem with a pulled forage wagon. This makes for awkward manoeuvering and sometimes poor visibility. The material intake area provides minimum shielding and the opening is sufficiently large to allow a man to be drawn into the machine. The heavy rotating cylinders with their sharp cutting knives often require adjustment by the operator. This fact, coupled with the tendency of the machine to plug up, renders it particularly hazardous to work with.

- Gravity wagons (rated 2 in the Background Study) are designed with steeply sloping sides that can lead to the operator slipping down into the wagon. The weight carried by these wagons makes them highly unstable at road speeds, posing safety hazards to the operator and other road users. Poor visibility and inability to brake quickly are problems that are increased by the attachments sometimes used on these wagons to increase their carrying capacity.

- Silo unloaders (rated 9 in the Background Study) normally operate in locations that are remote from the power "on/off" switch. The components run at high voltage. The auger and teeth are exposed and extremely hazardous when associated with the poor footing in a silo and the workers' inability to stop the machine or communicate easily with someone who might do it for him. Maintenance is cumbersome, especially when the unloader is located at the top of the silo.

The statement in the brief of the Simcoe Area Women's Institute "We shudder as we watch the whirling pulleys, chains (some of which have teeth), power take-offs and belts in operation," describes machinery made in an earlier period, but much of which is still in use. Combines, corn pickers and forage harvesters made during the 1950s and 1960s have numerous unguarded components as mentioned in the quotation. The power take-off (PTO) and functional components such as snapping rolls, husking rolls, cutters and gears were, for the most part, left unguarded. Some of these early designs led to frequent work stoppages (plugging, chain breakage, etc.) which placed the operator in danger while restarting the rolls and other moving parts.

During the past two decades design changes to improve production efficiency have also improved the safety features of many machines used on farms. These changes have tended to reduce the number of moving parts or build them into the machine in ways that render them relatively harmless. In addition, much better shielding is used. An example of these developments is the trend to harvesting corn by the shelled rather than the snapped-ear method. The associated modifications place snapping bars over the formerly exposed rolls, thereby reducing the chances of an operator being pulled into these aggressive mechanisms.

Despite the developments mentioned, safety concerns remain. Accidents with augers that are not properly shielded are reported every year, and, as the Background Paper on machinery suggests and survey data[17] confirm, anhydrous ammonia applicators contribute to painful injuries that may be burdensome for a lifetime. Similarly, silo unloaders and manure handling equipment have not benefited as much from the trend to better design and guarding that has changed much field machinery. Operators continue to remove shields and ignore operating instructions; attempt to remedy plugging and other problems while a machine is still running. Some are injured; some are killed; but the majority get away with their ill-considered acts.

Two courses of action are open. One is a program of sharply increased farmer and farm worker awareness of the risks associated with using farm machinery and about the need to handle it with the greatest care. The second is to exert as much influence as possible on the machine manufacturers to reduce accident risks by improving machinery design and shielding still further and by making safety features standard rather than optional.

The Task Force recommends:

16. that the Agency make every effort to ensure that the training of farmers and farm workers in machinery operation and maintenance is widely available, of high quality and heavily promoted among farmers;

17. that the Agency in conjunction with commodity associations promote a voluntary audit program covering the safe installation, maintenance and operation of mechanical equipment on Ontario farms and design a system of awards to encourage cooperation in the program.

Shielding and Power Take-off

Shielding and guarding systems are installed on farm machinery to protect users and bystanders from unintended or unplanned contact with fast moving parts or other hazardous components. When these protective devices are removed to service a machine or are left off it during operation, accident risks are increased.

Although no data are available that document fatalities or lost time injuries resulting from missing shields or guards, the importance of using and maintaining these safety devices was a major theme in both written and oral briefs to the Task Force. Farmers readily admit that they often work with machines from which shielding is missing. They do this mainly because the shield or guard is inconvenient and time-consuming to remove and replace or because it becomes damaged and is difficult to repair.

Greater convenience is needed in removing and replacing shields and guards. This could be achieved in many instances by replacing nuts and bolts with hinges and quick-lock devices that render it impractical to leave shields out of their normal positions. Also, it is important that they be made of strong material that resists damage and that they be designed into the machine rather than be an "add-on" feature. In brief, shields and guards need to be convenient, have structural strength and reliability, and be economical to manufacture and maintain.

There is no legislation in Ontario outlining shielding and guarding requirements on agricultural machines. However, both the Federal

Republic of Germany[18] and Great Britain[19] regulate the design of these safety features in mobile equipment and such devices as augers, feed mix bins and feed grinders. In the United States comprehensive regulations are set out at the federal level by the Occupational Safety and Health Administration (OSHA). The stated purpose of the OSHA regulation is to "provide for protection of employees from the hazards associated with moving machinery parts of farm field equipment, farmstead equipment, and any equipment used in any agricultural operations."[20] It defines what must be guarded, guard strength, servicing and maintenance of guards, the use of warning signs and other specifications.

Despite comprehensive guarding requirements, it remains the responsibility of the owner/user to make certain that shields and guards are properly maintained and in place. Because the farmer and worker behaviour component is particularly important in the effective use of shields and guards, it is essential that they be kept constantly aware of the part they must play in their use.

The Task Force recommends:

18. that it be mandatory for shields and guards supplied with farm machinery to be in place when the machinery is operating and that compliance with this requirement be monitored;

19. that shielding and guarding devices (as recommended by an authority to be appointed by the Ontario government, Recommendation 22) be mandatory on new farm machinery purchased in Ontario after a date to be specified in legislation.

A particularly important application of shielding on farms relates to the mechanical transmission of tractor power to other machines. The power take-off (PTO) mechanism consists of a spindle, usually located at the rear of the tractor, and a rotating shaft attached to the spindle, which carries the power from the tractor to a pick-up spindle on the implement to be used. The PTO shaft operates within an independent shield, or casing, which protects workers from coming into direct contact with it. However, these shields usually become damaged with use and, damaged PTO shields are often removed and not replaced, or perhaps replaced, with substandard or ill-fitting parts.

The safety hazards of this mechanical power transmission arrangement are well recognized by farmers and farm workers. The severity of the accidents caused when workers' clothing or limbs are caught in unshielded PTO shafts, spindles and pins explains this awareness. The fatality data published by the Farm Safety Association and reports made directly to the Task Force verify the danger of even the slightest miscalculation when working with exposed PTO shafts and spindles.

Movement of a tractor and an attached implement over irregular land and other rough surfaces causes constant moving and shifting of the PTO equipment. This in turn may damage and weaken the shielding or guard, which is usually constructed of light steel piping or plastic. The constant movement mentioned, coupled with natural wear and tear, results in the guard developing flaws such as cracks, nicks and material fatigue. As these conditions worsen, the function of the shield is affected, and the possibility increases of loose clothing, hair, or other objects being caught on the jagged metal edges and of serious injury resulting. Therefore, inspecting the PTO shaft and guard before use and keeping clear of the PTO while it is operating are precautions necessary to ensure the safety of both operator and bystander.

It seems likely that mechanical power transmission on farms may be eliminated over the next few years by use of hydraulic methods. Hydraulic power transmission is already well developed and can become a major element in the design of farm machinery. Adoption of this technology should be encouraged by health and safety authorities because it has a potential to remove the source of some of the most severe accidents that occur on farms.

Maintenance

The National Safety Council reported in 1982 that 12.7 per cent of total farm accidents in the United States were attributable to machinery maintenance activities.[21] No comparable statistic is available for Ontario but a review of a few of the Farm Safety Association's annual reports of farm fatalities leaves no doubt about machinery maintenance work being a major factor in these most severe of farm accidents. Summaries of instances mentioned in these reports give a clear impression of the sources and nature of maintenance accidents. They include:

- operators crushed while working under improperly blocked corn or grain combine headers that fell while repair was in progress;
- operators caught in rollers, chains and other moving parts while repairing running machinery;
- an operator being decapitated by the plunger arm of a running bailer while attempting to adjust the knotting mechanism; and
- a worker being crushed while changing a heavy, ballast filled tractor tire.

In addition, a substantial proportion of lost time injuries on farms are almost certainly maintenance related.

Proper scheduling of machine maintenance is clearly critical. There are long periods each year when most field machinery is not used. Repair during these times, which tend to coincide with slack periods in other farm work, is likely to mean that the maintenance is of better quality than if it is done in an urgent or emergency situation. Higher quality maintenance should reduce breakdowns in the field. These outcomes have two health and safety advantages. First, scheduled maintenance is likely to be done somewhat more deliberately and with more appropriate tools and support equipment thereby limiting accidents in the course of the maintenance work itself. Field maintenance, on the other hand, is an interruption of urgent plowing, seeding, cultivating or harvesting activity and is frustrating to the farmer. Frequently it is done with inadequate equipment (as in the first illustration above relating to corn and grain combines) and in a hurry, and may be viewed as a temporary solution. These circumstances have a high potential for contributing to accidents during the maintenance work and, perhaps, in the further use of what may be poorly serviced machines. Effective scheduling cannot fully prevent downtime of machines during the busy season but it can minimize inadequate, last minute repairs.

The quality of the maintenance work done on farm machinery is related to factors other than scheduling. Machinery maintenance skills are critically important and become increasingly so as more farm machinery is used and as it increases in power, speed and sophistication. Obviously well informed people appearing before the Task Force left no doubt that expert machinery maintenance is essential to the safe operation of present day farms. Yet much maintenance appears to be done by people who have limited qualifications for the work. At the same time, farmers have shown marked resistance to becoming involved in machinery maintenance training proposed by the Farm Safety Association and the Ministry of Agriculture and Food.

The Task Force does not mean to depreciate the mechanical skills of farmers and farm workers, which are likely to be adequate to carry out maintenance functions that are required on a regular basis. However, a great many Ontario farmers have to master a wide range of skills, and they are unlikely to achieve a high level of competence in all of them. Specialized repairs of braking, steering, hydraulic and electrical systems usually require a high degree of technical expertise, and, where they cannot be handled properly on the farm, the services of dealers and other sources may be needed.

Securing off-farm maintenance service can be expensive. Consequently, the income squeeze that many Ontario farmers have experienced in recent years has a direct bearing on machine maintenance practices and related safety considerations. The seriousness of this concern was brought forcefully to the attention of the Task Force by a number of operators of small or medium-sized farms during the course of its hearings. Not only is maintenance neglected because of lack of income, but these farmers cannot afford to replace equipment when it should be replaced. The urgency of concerns expressed about this situation could not be mistaken, and the health and safety implications of it are equally clear.

The Task Force has not been able to explore the area of machinery and equipment maintenance in the detail needed to make specific recommendations. On the other hand, it has no reservations about the importance of the issue and the need for advanced maintenance skills. Therefore it recommends:

20. that training in farm machinery maintenance be offered through the Colleges of Agricultural Technology and night classes in Secondary Schools;

that it be heavily promoted among farmers, farm workers and farm equipment dealers; and that those who take the training be eligible for financial assistance normally available to persons taking skill upgrading courses.

Communications and Standards

Throughout the discussion of machinery, reference has been made to the need for farm worker and, more particularly, farmer awareness of the safety risks associated with it. The Task Force believes that measures using posters, radio and television announcements and programs, courses, demonstrations and any other appropriate devices should be used to keep the specific risks associated with machinery and the methods of maintaining effective protection against them constantly before the farm work force. The awareness initiatives should be tailored to deal with:

- the causes of tractor rollover and how to prevent them;
- the dangers of operating farm equipment without someone at the controls;
- the risks of carrying passengers on farm tractors;
- the need for alerting bystanders before farm equipment is moved;
- the hazards of servicing operating machinery, especially power take-off arrangements;
- the necessity to maintain shields in place and in good condition; and,
- the dangers of servicing machinery without proper support equipment and tools.

The Task Force recommends:

21. that high profile awareness measures be developed and continually used to maintain farmer and farm worker alertness to the safety risks associated with the maintenance and use of farm machinery.

The study done for the Task Force by the Ontario Centre for Farm Machinery and Food Processing Technology and conversations at its public hearings have made it clear that farmers have difficulty in bringing their views about the design and quality of machinery to the attention of the large manufacturers. The situation is somewhat different where small and medium-sized Ontario based manufacturers are concerned. The equipment they make is frequently designed to specifications worked out with the farmer. However, for tractors and other large machines that are not made in Ontario, no such communication opportunity exists. Equipment dealers take some responsibility for informing manufacturers of local requirements but comments to the Task Force suggest that this is not an effective means of getting farmers' concerns recognized.

A factor that inhibits communication is the absence in Ontario of an association that represents the farm machinery manufacturing industry as a whole. There is no agency that coordinates information about farm machinery and that exerts influence directed toward the adoption of better and safer designs. This deficiency makes it impractical for farmers and the manufacturers to communicate with each other about their respective needs and capabilities.

The situation outlined results in a failure to define standards or specifications that farm equipment in Ontario should meet and a lack of the necessary information on which to base such standards. To ensure that farmers' needs are met, it is suggested that the government designate an authority to be responsible for standards development and the communication of the results of its work to the major equipment manufacturers. By this means, equipment design should be influenced to meet the requirements of Ontario farmers. The Task Force recommends:

> 22. that an existing agency (the Ontario Centre of Farm Machinery and Food Processing Technology or the Ontario Farm Machinery Board) be given responsibility for keeping itself informed about experience with farm machinery in Ontario, establishing safety standards for machinery performance and influencing farm machinery design and construction.

CHAPTER FOUR

STRUCTURES, FIELDS AND YARDS

Most farm work is done in fields, yards and buildings and on roadways. From an occupational health and safety perspective, these locations provide a highly favourable work environment. Some, however, pose serious hazards even to cautious workers.

Approximately one-quarter of the Ontario farm work-related fatalities have their principle source in factors other than machinery. Of the 176 fatalities that occurred between 1979 and 1982, 40 were associated with structures and materials other than machinery.[1] As Table 6 indicates most of the 40 were associated with different types of structures. Tabulations of all farm fatalities, as opposed to work related ones, compiled by the Farm Safety Association for the years 1979 to 1983 tend to support these findings.[2]

Table 6
Farm Work Related Fatalities Associated With Sources Other Than Machinery
Ontario, 1979-1982

Structures and Materials	Total
Silos and Bins	9
Water and Gas	8
Trees, Lumber, Poles	5
Electricity	5
Barn	4
Manure Tank and Cleaner	4
Fire and Lightning	2
Animals	2
Gasoline	1
Total	40

Sources: Farm Safety Association Inc., Farm Fatality Reports, 1979-1982, and Office of the Chief Coroner, Ontario Ministry of the Attorney General.

Compared with machinery, fixed workplaces contribute a relatively small proportion of farm fatalities, but the reverse appears to be true with respect to lost time injuries. Inspection of the data in Table 5 (p.68) confirms that most lost time injuries among hired workers in agriculture are attributed to inanimate objects other than machinery, vegetation, working surfaces, animals and the weather. The dominance of these injury sources suggests that a high proportion of lost time injuries are associated with fields, yards and buildings as opposed to machinery and chemicals. The data in Table 7 reinforce this view showing that over 71 per cent of the accidents classified by type of injury involved being struck by or against an object, lifting, slipping, tripping and falling. While the data are less specific than would be desired, they make it clear that fixed facilities, handling of materials and work movement are major contributors to lost time injuries occurring to hired farm workers.*

Briefs to the Task Force and its Background Papers indicate more explicitly than the data outlined above the health and safety hazards associated with farm structures, fields and yards. While these sources place considerable emphasis on physical features of these facilities, they tend to emphasize such matters as gases, dusts, noise and other conditions that arise in the course of their use in farming. In this chapter the Task Force draws attention to a few of the priority hazards associated with fixed facilities and other farm work locations. However, as in its discussion of machinery, it does not attempt to consider all of the health and safety concerns that may arise when people work in barns, granaries, fields, woodlots and other locations.

Gases

Gases that are heavier than air are a health and safety hazard in farm work in Ontario. They are a problem mainly in silos and animal confinement barns, and occasionally, in poorly ventilated shops. Gases

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* It should be kept in mind, that the fatality data discussed above refer to all people who work on farms, while the lost time injury data reflect in the main, the experience of hired farm workers.

Table 7

Number of Lost Time Injuries in a Five Year Period, 1978 - 1982, Ontario, By Type of Injury and Farm Enterprise

	Type of Injury											Total	
Farm Enterprise	Struck By or Against Object	Lifting	Slip or Trip	Fall	By or In Machine	By Animals	Caught Between or In Objects	By or In Licensed Vehicle	Tobacco/ Other Poisonous Plants	Poisonous Fumes Chemicals	Repetitive Movement or Over Exertion	Electrical Current	Number	Proportion
	- number -												no.	percent
Nursery and Landscape	707	655	357	163	277	6	106	72	24	24	41	1	2433	21.2
Tobacco	542	468	263	344	356	5	111	60	154	4	46	4	2357	20.5
Fruit and Vegetable	356	259	164	354	195	1	61	33	10	17	17	—	1467	12.8
Mushroom	185	74	197	169	36	—	36	32	1	5	1	3	739	6.4
Greenhouses	189	125	85	37	19	1	14	11	5	23	8	—	517	4.5
Cash Crop	68	27	23	35	62	1	15	7	—	2	4	1	245	2.1
Sub-Total	2047	1608	1089	1102	945	14	343	215	194	75	117	9	7758	675
Dairy	222	136	163	122	188	210	37	20	—	11	8	2	1119	9.8
Poultry	188	161	101	55	49	13	35	11	5	10	10	—	638	5.6
Horses	50	50	28	29	14	219	15	2	—	1	3	—	411	3.6
Beef	114	65	72	55	79	68	31	12	2	6	—	—	504	4.4
Pork	50	28	25	14	26	38	14	—	—	3	1	—	199	1.7
Sub-Total	624	440	389	275	356	548	132	45	7	31	22	2	2871	25.1
Drainage	99	44	31	31	23	—	22	6	3	2	1	—	262	2.3
Other	196	94	49	61	106	10	34	14	5	5	13	1	588	5.1
Total-Number	2966	2186	1558	1469	1430	572	531	280	209	113	153	12	11479[*]	
Total-Percent	25.8	19.0	13.6	12.8	12.5	5.0	4.6	2.4	1.8	1.0	1.3	.2		100.0

Source: Farm Safety Association Inc., Survey of Agricultural Lost Time Injuries, Annual, 1978 - 1982.

[*] Deletion of injuries not classifiable by variables shown reduced the total below the 12,200 reported between 1978 and 1982.

found in other locations are rarely in sufficient concentrations to be hazardous to either animals or man.

Silo Gases

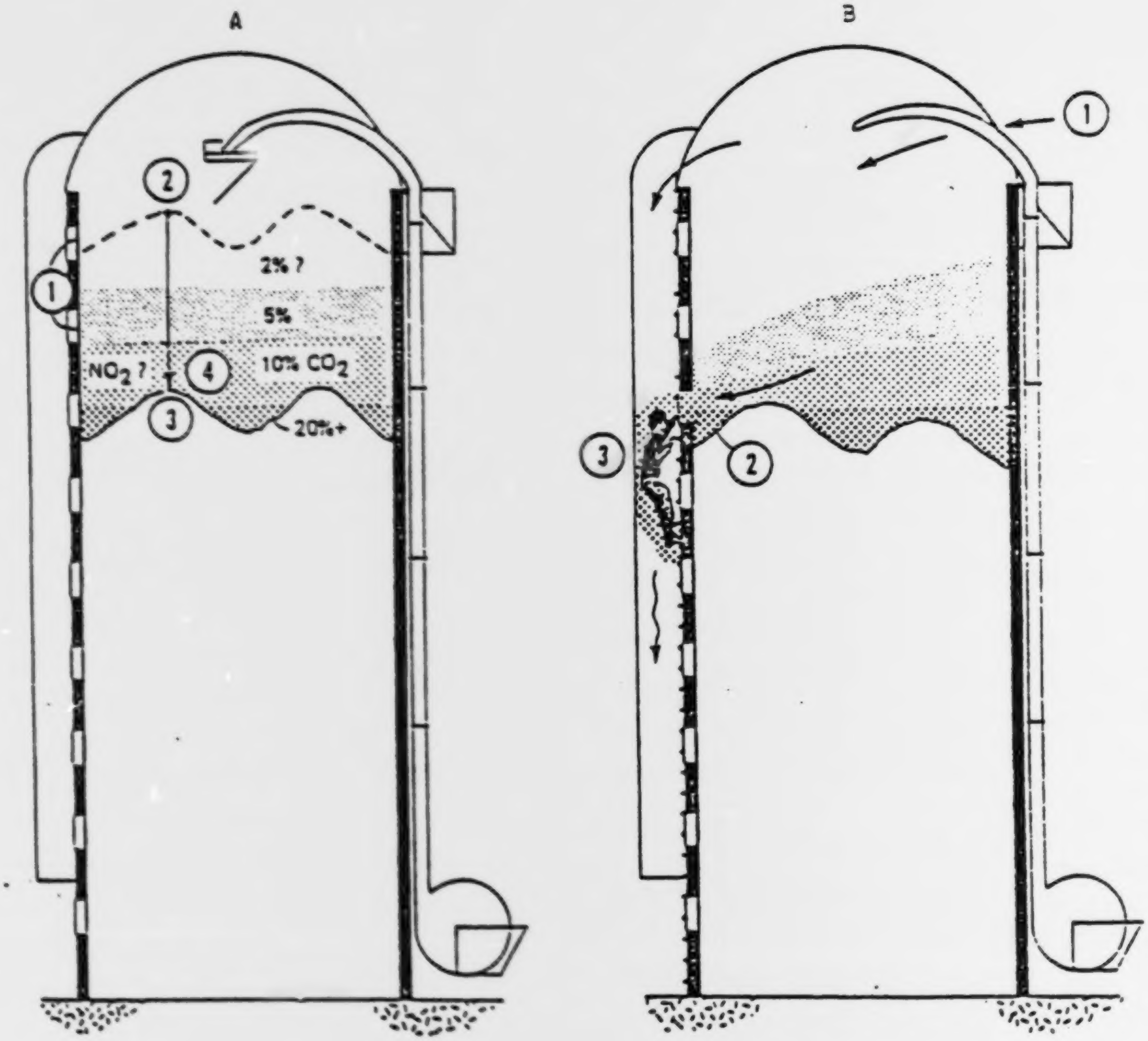
Farm silos are containers for storing cut forage and grain to be used as animal feed. They are found on almost all dairy farms in Ontario and are increasingly common on hog and beef farms. Where large concentrations of animals require convenient sources and large volumes of high quality feed, silos are needed. There are approximately 50,000 vertical silos on the province's farms and many horizontal ones.

Freshly made silage is a porous mass of recently cut plant material. Almost immediately after being put into the silo the silage begins to ferment using up any oxygen supplies available. This process always results in the formation of carbon dioxide gas (CO_2) and, when the crop being stored contains high levels of nitrogen, oxides of that substance, including nitric oxide (NO) and nitrogen dioxide (NO_2) are also formed. All three of these gases are heavier than air.[3]

Generation of the gases begins almost immediately after the plant matter is blown into the silo. They usually reach their maximum concentration within hours, but take three to four weeks to dissipate. As the silage settles (Figure 5), the gases are squeezed out of it into the silo headspace and concentrate down near the silage surface. If an unsealed silo is almost full, winds may ventilate it sufficiently to reduce gas concentrations below dangerous levels. However, when a deep headspace exists, as shown in Figure 5, the heavy gases are not easily dispersed and have to be removed by pumping or forcing large volumes of air into the headspace.

In airtight silos the formation of oxides of nitrogen is of less concern but carbon dioxide is a serious hazard. Entry to the headspaces of these silos rarely occurs, and it is recommended by the manufacturers that farmers call in expert maintenance personnel if it is necessary to enter the bottom of the silo to repair unloading equipment or for any other reasons.

Figure 5



1. silo chute doors, closed for filling
2 top of silage just after filling
3 settled silage
4 dense silo gas, squeezed out of the silage, remains in the headspace

A. Typical unsealed tower silo just after filling.

1. wind blows through open hatch and top of chute, ventilates silo dome and top of headspace
2. highest concentration of silo gas is at the lowest part of the headspace
3. workman opens chute door, silo gas pours down into chute

B. Behavior of silo gas on opening of a silo chute door.

Source: International Silo Conference, Kitchener, 1984.

It is at the time that silos are being filled and immediately afterwards that farmers most frequently enter them, especially unsealed ones. The reasons for this, as cited by the Farm Safety Association, are to:

- make certain silage blown into the silo is evenly distributed;
- replace or repair the silo chute doors; and,
- install and adjust silo unloading machanisms to avoid unloading problems in the months ahead.

The health and safety effects of silo gases are both acute and delayed. The results of exposure to high concentrations of carbon dioxide scarcely need comment. If the gas displaces the air in the silo, suffocation follows immediately on entry. For the person caught in carbon dioxide flowing down a silo chute, the exposure may not be fatal, but for one who jumps into the silo headspace from the top, there is almost no possibility of escaping death if the concentration is sufficient to displace the air.

Oxides of nitrogen cause silo fillers disease but the consequences vary with the intensity of exposure. In very heavy concentration they bring about spasms of the larynx and other airways, which cut off the supply of oxygen to the lungs causing immediate loss of consciousness and death. At lesser concentration, the gases are inhaled deep into the lungs where on contacting moisture they form nitric acid, which burns the delicate tissues that transfer oxygen to the blood. There are both immediate and delayed effects. If the burn is sufficiently severe, the tissues respond by generating a fluid, which floods the lung air sacs. Within several hours, fever, coughing, wheezing, nausea and shortness of breath occurs. The condition blocks oxygen transfer from the air to the blood and death is likely to result unless vigorous treatments are undertaken promptly. Those who recover normally show additional problems within two to six weeks after the exposure. These are signalled by fever, chills and shortness of breath. The condition is brought about by the growth of repair or scar tissue in the lungs, which also inhibits the transfer of oxygen to the blood. The condition can progress to death within a few days or weeks, but treatments are available that can prevent this and, in many cases, bring about substantial recovery.[4]

The number of reported farm fatalities resulting from exposure to silo gas is not large. However, "death can occur many hours or even weeks after exposure has occurred and the relationship between the two events may not be recognized. Silo associated deaths may be much more frequent than your (Ontario) statistics indicate."[5] Because the generation of silo gases is an integral part of the feed supply process on many farms, it is essential that all farmers are fully aware of the dangers associated with it. All could be prevented by exercising reasonable care. The fact that a high proportion of silo accidents involve multiple fatalities has to raise the question of whether or not knowledge of these dangers is widespread. It is clearly imperative that stronger protective measures than have been used in the past be taken.

One need is for a low cost reliable instrument for taking remote samples of silo gas at distances of up to 60 to 80 feet from the worker. Gas detectors have been developed, but to the moment one that combines the necessary characteristics of convenience and low cost is not yet available. The brief to the Task Force of the York County Federation of Agriculture, states, "We believe detection equipment must be portable, simple, economical and reliable, possibly a strip of treated paper that would change colour when exposed to toxic gases." It went on to say that complex monitoring equipment is not practical because of expense and the "conditions present around silos," which would probably cause it to become unreliable after a period of time. Also, the equipment must be light and of limited bulk because it has to be carried up a ladder, which may be enclosed within a silo chute or may be open to the elements.

If gas is present, detection equipment does not solve the problem facing the farmer who needs to enter his silo. The requirements are to have a reliable ventilation system that will remove the gas and to ensure that such ventilation is always carried out before entering the headspace in the period when any possibility of danger exists. If careful procedures are followed, ventilation may be achieved by pumps, turbulence created by blowing air into the silo or by draining the gas down the silo chute. However, this last mentioned method must not be attempted while the worker is in the position illustrated in Figure 5. The various procedures for silo ventilation were discussed in detail at the International Silo Conference[6] held in 1984 and in the Fact Sheet "Silo Gas - A Swift and Silent Killer" published by the Farm Safety Association.

The difficulties of disseminating the detailed information required and of preventing farmers and farm workers from ignoring the necessary safety procedures is recognized. However, the Task Force believes that, considering the present state of silo design, workers must ensure their own protection against silo gases and that they should do this by invariably ventilating the silo headspace before entering it whenever there is a possibility that heavier-than-air gases are present. It is essential that everyone who works in and around silos is aware of the health and safety hazards of silo gases and knows how to eliminate them. The Task Force recommends:

23. that a high profile information program warning farmers and farm workers about the characteristics of silo gas and the dangers inherent in exposure to it and informing them of all necessary protective measures be a top priority of the Agency.

24. that the Agency and commodity organizations representing farmers who use silos develop for these farmers a system of convenient access to reliable gas detection devices.

Manure Gases

As they break down or decompose, stored animal wastes produce many different gases. Those of concern to worker health and safety are ammonia (NH_3), carbon dioxide (CO_2) and hydrogen sulphide (H_2S). These gases are heavier than air and tend to settle on barn floors and depressions in them. They are most likely to accumulate in dangerous concentrations in animal confinement barns that are constructed immediately above manure storage facilities and in pits where pumping machinery for disposal of animal wastes are located. Investigations done in the United States have found that concentrations of gases in these locations frequently exceed recommended levels for workplaces, and some serious accidents have resulted from this.[7]

Hydrogen sulphide is recognized as the most hazardous of the three gases mentioned. It is produced continuously in areas of aerated manure collection, that is, not only in storage tanks and similar facilities but also in barn gutters. Because it is heavier than air, it tends to remain in liquid storage facilities until they are agitated or drained. When this occurs, it may be released in large volumes and is of particular concern where livestock holding areas are located immediately above the storage pit. Since the gas may reach high levels of concentration in the holding areas and has acute toxic effects on both humans and animals, it presents serious risks.

Exposure to manure gases was not brought to the attention of the Task Force as a source of fatalities or work injuries in Ontario. Care in observing relatively simple procedures that have been set out by the Farm Safety Association in its "Fact Sheet - Manure Gases" should ensure protection for both workers and animals. The Task Force believes that the procedures recommended by the Association meet the need for worker protection relating to this problem and that they should be frequently brought to the attention of farmers and other farm workers.

The only gases other than those generated in silos and by manure that appear to be hazardous to Ontario farmers and farm workers occur in repair shops. During cold weather, these shops may be tightly closed, and internal combustion engines tested or welding done without taking the precaution of ensuring adequate ventilation. Accidents arising from this source do not appear to be commonplace, but the members of the Task Force are aware that some have occurred and believe it is important that farm people be kept alert to the dangers associated with operating machinery in confined spaces.

Dust

There is limited information on the extent of dust caused health problems among farmers in Ontario. However, the matter was mentioned in a few briefs to the Task Force and noted as a serious concern in the background studies done for the Task Force by the Canadian Centre for Toxicology and by the Occupational Health Program of McMaster University. It is important to draw attention to two dust-related health problems of which there is some evidence of occurrence in Ontario.

Farmer's lung is a widely observed respiratory condition among farmers in North America and Europe caused by inhalation of dust from mouldy hay and, perhaps, silage. A major component of this dust has been shown to be spores from fungi, which a number of studies have identified as the cause of an allergic reaction in some people.[8] In acute form the illness results in breathlessness and other symptoms similar to those of the flu and recovery usually occurs within a week. A more serious form of the disease arises from repeated exposures that may be in such small doses that the individual may not be aware of their occurrence. The long term danger is that the repeated assaults may result in the development of scar tissue in the lungs which permanently damages the transfer of oxygen to the blood. The breathing problem increases with additional exposures and, in advanced stages, seriously impairs the farmer's capacity to work.[9]

Because of the similarity of the symptoms of farmers' lung to other more common health problems, it has a history of incorrect diagnosis. Medical literature suggests that incorrect diagnosis is likely in Ontario and, as a result, the occurrence of the condition among farm workers may be seriously underestimated. A special investigation of farmer's lung conducted for the Farm Safety Association in 1980 reached the following conclusions.

- The possibility of farmer's lung should be considered in any farm worker suffering from shortness of breath and where there is no evidence of cardiac failure or airway obstruction;
- Farm workers who have acute reaction to exposure to mouldy hay are often diagnosed as suffering from the flu or pneumonia. In many instances, it is only after a lengthy attempt at treatment that other conditions are considered. Yet, an acute case of farmer's lung is not difficult to diagnose, provided a proper history is taken;
- Subacute response to the spores is rarely diagnosed. This insidious form of the disease, with antibodies still present three to four years later, was estimated to occur in 20 to 40 per cent of farm workers.

The author of the report recommended that physicians serving the farm community should be made aware of when to expect farmer's lung, what the symptoms are and how it is diagnosed.[10]

A similar need for attention to respiratory problems is indicated among mushroom workers. Mushroom spores may cause lung irritation and fibrosis which, like farmer's lung, impairs breathing capacity. Instances of adverse respiratory reactions to work in mushroom barns have been reported recently in the press in Ontario. Removal from contact with the compost in which mushrooms are grown is necessary to limit development of the disease.[11]

Review studies done for the Task Force leave no doubt that exposure to grain dusts may impair lung function and should not be regarded merely as a nuisance. The agents in the dusts that cause respiratory problems are complex and not fully understood but appear to involve intrinsic properties of some grains as well as fungal spores or toxins. The evidence available is that moderate exposure to grain dusts may damage health but that the conditions respond to medical treatment.

Health problems associated with grain dusts are a source of concern among some Ontario farmers. One brief notes that "grain dust and its ensuing problems should be taken more seriously. Masks must be more efficient and more comfortable if they are to be worn when necessary. At present they are not readily available."[12] The work of the Occupational Health Program at McMaster confirms the farmer's concern and the problems encountered in dealing with it.

> "The scope of respiratory diseases among farm workers in Ontario is wide-spread and requires greater awareness among physicians as well as farm workers. Specific conditions such as farmer's lung are often mistaken for other conditions and education programs directed at physicians in rural areas would hopefully alleviate some of the under recognition of this problem. Preventive interventions such as improved ventilation can be carried out and approved respiratory protective devices can be distributed where necessary. Over long periods of time however, these devices may not be comfortable and compliance would decrease especially on long hot summer days. Certain individuals have difficulty wearing them or breathing through them. Knowledge of the type of hazard and the risk to health may serve to increase compliance with these devices."[13]

The Task Force is concerned that the dust related health problems outlined receive attention and believes that the matter can be investigated in a preliminary way through the survey activity already proposed in its Recommendation 6. It may be that standards are required but at least the problem of availability of protective equipment requires the attention of suppliers and government agencies responsible for health and safety on farms. As for user acceptance of the protective equipment available, the problem is exceedingly difficult to solve but it requires higher priority attention than it has received in the past. In addition, the Task Force recommends:

25. that the Agency take responsibility for preparing and circulating to Ontario doctors information about the symptoms of dust-related diseases and the conditions in which dust-related diseases are likely to arise among farmers and farm workers.

26. that the Agency explore problems of dust-related diseases among farmers and the availability and use of the appropriate protective equipment.

Noise

Mechanization, combined with long hours brings about extensive noise exposure for people who work on farms. Studies show that large and powerful machinery is a principal source of noise exposure at levels likely to damage human hearing.[14] Noise may reach these levels in fields where tractors and other types of machinery are used and in barns where feed mills, ventilating fans, pumps and animals are the major sources of it. The problem is particularly acute in hog barns.

The hearing damage depends mainly on how loud the noise is and the duration of exposure to it. The frequency, or pitch, may also be a factor, with high pitched sounds (squeaking of a door hinge) being more likely to cause hearing impairment than low pitched ones (the rumble of thunder). Farmers and farm workers need to understand what constitutes dangerous noise conditions because excessive exposure will permanently destroy their sense of hearing. This, in turn, will cause other health and safety problems, most obviously, an inability to recognize warning signals.

Because of the ways in which noise affects human hearing, both volume and duration of exposure must be considered in protective measures. It is widely accepted that for a person working eight hour days and 40-hour weeks the noise level in the workplace should not be more than 85 decibels.* As sound levels increase, the duration of exposure to them must be reduced to protect human hearing, and the Occupational Health and Safety Act presently restricts exposure to one-half hour at 110 decibels, one-quarter hour or less at 115 decibels and no exposure where the sound level is in excess of 115 decibels.

While sound level meters are readily available it is not practical to expect a farmer to have one on hand to test every potentially hazardous work situation. Guidelines used by the Province of Saskatchewan in explaining its noise regulations,[15] and by the Farm Safety Association indicate as follows:

Source	Sound Level
Rustling leaves	20-30 dB
Normal conversation	60-65 dB
Heavy traffic	80 dB
Power saw, tractor under load, motorcycle or snowmobile	100 dB
Jackhammer, amplified rock music	120 dB
Vicinity of jet plane on takeoff	130-150 dB

Because of long hours spent operating tractors and other field machinery, it is obvious that many farm people receive excessive noise exposure from these sources. Considerable effort has been made to reduce exposure to tractor noise through development of sound insulated cabs. However, these are not universally used and other machines may present equally serious noise hazards. At the same time, the Task Force received reports that people use radios in tractor cabs to drown out the machine generated noise! It is important to keep in mind that any noise levels in excess of the limits discussed above are likely to damage hearing.

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* Sound or noise is measured against a decibel scale that is logarithmic or multiplicative in structure, that is; an increase of 10 decibels (dB) represents a 10-fold increase in sound, or the sound delivered at 95 dB is 10 times greater than that delivered at 85 dB.

A study sponsored by the Pork Producers' Marketing Board[16] indicates that workers in hog confinement barns are at risk of developing noise produced hearing loss unless measures are taken to limit their exposure to it. The study reported the noise ranges set out below for specific tasks undertaken in hog barns:

Task	Sound Level
Feeding Sows	95-110 dB
Breeding	80-105 dB
Handling Piglets	80-105 dB
Grinding Feed	90- 98 dB
Around Tractors	80- 95 dB

While the readings may vary between different facilities, they indicate the presence of a potential hazard which may irreversibly damage worker hearing.

Noise created by animals is not easily controlled by engineering measures and, in confinement barns or other facilities where animal noise levels are unacceptable, hearing protection devices must be used. These are available either as ear muffs or plugs and can be effective in reducing noise levels by 10 to 15 decibels. It is important that the protective devices be used consistently in workplaces where they are required. However, there is relatively high worker resistance to using most types of protective equipment, and that relating to noise is no exception.

The Task Force wishes to draw attention to the importance of noise abatement on modern farms and to urge that health and safety educational programs for farmers and farm workers constantly keep the matter before them. Also, the Task Force believes that the appropriate authority should work with machinery manufacturers to reduce noise levels through better engineering. In this connection, a substantial number of briefs presented to the Task Force noted the need to reduce machine noise through better design and to promote the use of protective equipment where the noise cannot be controlled. Farmers responsible for workplaces where sound levels are a health and safety concern should have the levels measured and take the protective action indicated.

Storage Hazards

Large bins or silos are commonly used to store grain, beans or similar products. Manure is collected in liquid or semi-liquid form in tanks or lagoons located under barns or in yards close by. A common feature of these facilities is the fact that workers or others can become entrapped in their contents and die of drowning or suffocation.

Drownings in liquid manure tanks or pits are not common occurrences in Ontario, but a few have been reported in farm fatality records in recent years. Where a storage facility is at ground level and not fenced, such instances may result from the slightest inattention on the part of the victim. The pit may have a large surface area and sides or banks that are exceedingly difficult or impossible to climb when it is only partly full.

Briefs to the Task Force show wide recognition of the hazards outlined and endorse the use of well-designed safety fences on open lagoon storage arrangements. Some persons appearing at the Task Force hearings would require that approved fences be mandatory elements of contracts to construct open pit and tank storage systems and that ladders reaching down inside walls also be standard equipment. This solution to the problem is widely accepted among farmers, and the Ministry of Agriculture and Food supports it through its Soil Conservation and Environmental Protection Assistance Program. This program runs until March 31, 1988 and offers grants of up to $5,000 for the construction of manure storage facilities on farms provided that, if the structure is an open pit or tank, it is equipped with a suitable safety fence. However, a number of unfenced tanks are already in place, and action is needed to reduce the safety risks associated with them.

The Task Force notes the recommendations made by the Coroner's Jury in connection with a manure pit drowning that occurred in Ontario in 1984. Two of them were:

- "Construction of child-proof fencing at least four feet (1 1/3 metres) high properly secured at ground level, with security locks for any self-closing gates and completely enclosing all existing and future uncovered liquid manure storage facilities, lagoons and/or ponds;
- "Construction of at least two internal metal ladders from floor to top of all existing and future liquid manure storage facilities. We feel this minimal requirement should be increased for larger manure pits."17

The Task Force is in agreement with both of these proposals and recommends:

27. that by March 31, 1988 all surface level manure lagoons and tanks on farms be enclosed by child-proof fencing at least four feet high, properly secured at the ground level and having self-closing gates and child-proof locks;

28. that at least two metal ladders be installed in all open lagoon and tank type manure storage facilities; and,

29. that to enable owners of existing unfenced manure lagoons and tanks to comply with Recommendations 27 and 28, the government provide financial assistance comparable to that already in place under the Soil Conservation and Environmental Protection Assistance Program for safeguarding new manure storage facilities.

The fatality data published by the Farm Safety Association make it clear that suffocation in grain or other produce is a hazard for farm children and those working on farms. Instances occur in grain transportation and storage facilities. Some arise because of people working alone in situations where the materials stored are unstable and others simply from the victim sinking into loose grain or beans. Frequently these situations result in the victim being covered by the grain or other material and dying of suffocation. While good work practices are the practical solution to this problem, they have to be associated with care that workers never enter these containers alone and that children are effectively discouraged from playing in them.

Animals

In recent years animals have accounted for approximately three per cent of farm work related fatalities and six per cent of the lost time injuries sustained by hired farm workers in Ontario. Accidents occur in almost any work with animals, but the risks are greatest in moving them about farms, fields and yards, through chutes and ramps and on and off transportation equipment. In carrying out these movements the need is to avoid situations in which animals may strike, crush or trample workers. A major thrust of the input to the Task Force was that expert handling greatly reduces the risks involved in working with animals. Thus, good quality training, in conjunction with on-the-job experience, appears to be the best protective measure.

The design and quality of facilities are important factors in safe animal handling. Solid walls and fences along with adequate and evenly diffused lighting are important design features that contribute to safety in both caring for and moving animals. Slippery floors are a common cause of animal accidents that, in turn, may endanger workers. Accordingly, there is protection in providing rough, but clean, floor surfaces. These considerations are oriented to product as well as worker safety and appear to be matters on which farmers exercise care. Nevertheless, the Task Force has observed that some serious animal handling accidents occur each year and that relatively young and older workers may be particularly vulnerable to them. Therefore, it urges that the commodity groups with special interests in livestock farming ensure that they integrate safe animal handling into the services they provide their client farmers.

Zoonoses, "diseases and infections which are naturally transmitted between vertibrate animals and man",[18] are a health hazard in farm work. More than 130 zoonotic diseases are known to exist but not all of these are associated with farm animals. They may be contracted by man through direct contact with infected animals or from an environment which an infected animal has contaminated.

The brief of the Ontario Ministry of Health advised the Task Force that zoonoses make up 50 per cent of the notifiable disease incidents in Ontario. (These are occurrences of communicable diseases that must be reported by doctors and health institutions to the Ministry of Health). While reports of zoonotic diseases may come from any population source, farm people are a group at special risk.

Some indication of the extent of the more common zoonotic diseases is indicated in the data tabulated below as reported to the Ministry of Health.

	Cases Reported		
Diseases	1981	1982	1983
Brucellasis	4	8	5
Q Fever (Coxiella)	11	22	21
Salmonella	N/A	3,170	3,537
Yersiniosis	147	243	508

The numbers shown refer to the total population, not farmers and farm workers only. In addition, in 1983, 402 people in Ontario received post-exposure treatment after being in contact with rabid farm animals. The exposures occurred from cows (316), horses (38), sheep (31), goats (16), and pigs (1). Of the above, brucellasis is considered to be under control in Ontario but as the data indicate, some of the other zoonoses are not.

A background paper prepared for the Task Force by the Occupational Health Program at McMaster University addressed the problem of communicable diseases as follows:

> "The effective elimination or treatment of infected animals is paramount to prevention of further cases or outbreaks of these diseases. The current public health system is well suited to maintaining surveillance of infectious diseases among farm workers and further worker education will enhance the reporting of these diseases. Family physicians may regard some of these as exotic diseases, however, many may easily misdiagnose them as common colds and flu. Specific diagnostic tests through the public health laboratories can more definitely establish the diagnosis and are readily accessible through the public health system. Education of family physicians again is paramount to enhancing the recognition of infectious diseases related to farm work.[19]

The information presented above indicates that zoonotic diseases are a significant health hazard. The fact that they are transmitted to humans by means as diverse as handling animal tissues, drinking milk and breathing dusts renders them difficult to control. In addition, control can be expensive. For example, a post-exposure treatment of rabies costs $500 excluding physician, hospital, transport of vaccine and perhaps some other costs.

While there is limited information about how common zoonotic diseases are among farm people, Ontario farmers and farm workers need to give special attention to this source of health hazard. The Task Force recommends:

30. that the Agency and Ministry of Health:

    - develop means of assessing incidence of zoonotic diseases among farm people compared with the remainder of the population;
    - inform farmers and farm workers of the seriousness of health conditions that result from zoonotic diseases; and,
    - provide farmers and farm workers with information on how best to avoid contracting zoonotic diseases.

Heights

Heights, and the ladders used in conjunction with them, are recognized as farm safety hazards. They contribute to accidents in connection with hanging tobacco in kilns, picking mushrooms and storing and retrieving hay in traditional barns. More important are the heights of silos and fruit trees and care in using the ladders needed to work with them.

Exposed silo ladders reach heights of eighty feet or more and are a major safety concern in the farm community. The height itself may be a problem to some workers, and the problem can be seriously aggravated when wet or freezing weather makes footing and handholds insecure. The fact that workers often have to carry equipment as they climb silo ladders adds to the safety risks. Wherever the topic was addressed during the Task Force's hearings, it was invariably proposed that silo ladders be enclosed in safety cages. The Task Force agrees with this proposal and recommends:

31. that safety cages on exposed silo ladders be mandatory on new and reconstructed silos in Ontario from a date to be specified in legislation;

32. that the Agency mount a program to encourage farmers to install safety cages on existing silo ladders that are not equipped with them.

While the heights encountered in picking fruit are not great, the ladders can be unstable if not correctly positioned. Also, a fairly large proportion of the workers who pick fruit are likely to be inexperienced. Difficulty in placing a ladder to reach some produce may result in risks being taken and account for some of the concentration of hired worker accidents in slips, falls and being struck by objects as shown in Table 7. Also, a fairly large proportion of workers who pick fruit are likely to be inexperienced, a fact that undoubtedly contributes to the incidence of ladder-related accidents. Other than employers ensuring that their workers understand the stability characteristics of three-point ladders and that they are of sound construction, the Task Force is not aware of action that can be taken to alleviate hazards associated with them.

Ground Conditions

Except for some undermined banks, overgrown ditches, groundhog dens, boulders and very steep hills, Ontario fields have few inherent safety hazards. Changed surface conditions associated with heavy rain, snow and frost, or the lack of it, may cause unexpected slipperiness, mires and water depths but most locations where these conditions occur on a farm are known to a farmer after one or two years of occupancy.

When associated with machines, animals or human error, ground conditions may contribute to farm accidents. It is particularly important that machinery be handled in ways that take account of the different ground environments in which it is used. The need for this is demonstrated in the following extracts from 1983 and 1984 fatality reports of the Farm Safety Association.

- "Victim was driving a tractor with a mower attached. Victim stopped tractor on a slope, got down off the tractor, left the engine running and did not lock the brakes. The tractor moved forward, turning left and ran down the hill. The victim was struck by the tractor or the mower."
- "Victim was sitting on the left rear fender of a farm tractor. The tractor struck a groundhog hole, the tractor jumped, the victim fell forward and in front of the left rear tire of the tractor and was run over."
- "Victim was attempting to cross a drainage ditch on a tractor. While attempting to climb the opposite bank the tractor flipped and pinned the victim under the tractor in the water."

There can be little question that the natural environment contributed to the incidents described but the real source of the fatality was the operator's lack of understanding of the capability of his machine or ill-considered use of it. Unfortunately, the three cases shown do not exhaust the number available in the ninety-eight fatalities reported in the two years mentioned but they indicate the need for better training in farm machinery operation. This is supported further by the fact that eight per cent of lost time injuries are attributed to ground and work surfaces.

Ditches are particularly important features of ground environments in bringing about tractor rollovers. Soft or steep shoulders on ditches located on farms or public roadways are particularly hazardous.[20] In some serious accidents they combine with high speeds or other unwise operating practices to cause rollovers and in others the operator may be unaware of the unstable conditions. An expert appearing before the Task Force made it clear that careful maintenance of ditches in rural areas could make a major contribution to farm safety.

The Task Force recognizes the contribution ground conditions can make to farm accidents. Unlike ditches, most of these conditions are not matters about which it is practical to take direct preventive measures. The protection needed is for farmers and farm workers to understand how various ground conditions affect machinery performance and to consistently consider them in doing their work.

Highways Travel

Farmers and farm workers spend a substantial amount of their working time on Ontario's roads and highways. Between the years 1979 and 1982, 26 fatalities involved farm vehicles on public roadways.[21] The lost time injury data are not classified to identify injuries attributable to highway accidents but they do make it clear that a number of such injuries occur in licensed vehicles (Table 5).

Highway safety in the course of farm work was a major concern in the minds of the Task Force members and those who participated in its public hearings. Discussions during the hearings showed that confusion exists among farmers about what is required of them when operating agricultural machines on public roadways and that there is rather extensive dissatisfaction with the manner in which the regulations that are in place are enforced. The principal concerns brought to the attention of the Task Force include young and inexperienced operators, abuse of slow moving vehicle signs, machine movement on public roadways, lighting requirements on roadways, restrictions on vehicle dimensions and inconsistencies in the enforcement of the Highway Traffic Act.

Young and Inexperienced Operators - The Highway Traffic Act is explicit in restricting the operation of farm vehicles on public roadways to persons 16 years of age or older. Sections 23.2 and 23.3 state:

> "No person shall employ or permit anyone under the age of sixteen years to drive or operate a motor vehicle, road-building machine, self-propelled implement of husbandry or farm tractor on a highway."
>
> "Subsections (1) and (2) do not apply in respect of the driving or operating of a self-propelled implement of husbandry or farm tractor directly across a highway."

Abuse of Slow Moving Vehicles (SMV) Signs - Judging from the frequency with which this matter has been brought to the attention of the Task Force, it is a major concern of the farm community. The triangular sign was designed, and defined in legislation, as a device for identifying slow moving agricultural machines and equipment travelling on public roadways. There are two concerns relating to it. One is the lack of recognition of the sign or understanding of its meaning by many drivers. The other is its utilization as gate or driveway markers, obstruction markers and a great many other functions for which it is not intended. Representations to the Task Force suggest that these abuses contribute to the failure of recognition and have generally led to a deterioration in the protective value of the device. The solution of the problem is seen to be action taken by the farm community, through safety associations and other agencies, and the police to restrict the use of the SMV sign to its indicated purpose and to make the general public more aware of its meaning.

Machine Movement on Public Roadways - There is much confusion surrounding the movement of agricultural machinery on public roadways. Information in the briefs indicates that many farm machine operators are unsure whether to drive on the road shoulder or on the road itself. In addition, the Highway Traffic Police are reported to give conflicting advice to farmers about what the proper procedures are. The Farm Safety Association has been working with the Ministry of Transportation and Communication, in an attempt to obtain clear instructions about the positioning of farm equipment when using public roads and to get a common understanding of the matter in the minds of enforcement officers.

Lighting Requirements on Public Roadways - This concern centres on the requirements for and utilization of four-way flashers, signal lights and reflective markers. Also, there were many suggestions from people presenting briefs that turn indicator signal lights be made mandatory on farm tractors and any towed implements. The Highway Traffic Act clearly outlines in section 44 (1) and 44 (27) the lighting requirements for farm tractors. Self-propelled units of farm equipment and implements of husbandry equipped with an electric lighting system are required to display at least three lights from one half hour before sunset to one half-hour after sunrise or when "insufficient light or unfavourable atmospheric conditions make persons or vehicles on the highway not clearly discernible at a distance of 150 metres or less." These lights must include either a white or amber light on each side of the vehicle's front end and a red light at the rear. Section 44 (24) of the Act requires that "every trailer and every object or contrivance drawn by a vehicle" must display at least one red light on the rear end.

Dimensional Restrictions on Public Roadways - Concerns were expressed in the briefs and the ensuing discussions about farm vehicle length, width and height restrictions on public roadways. "Over-dimensional farm vehicles" are farm tractors, self-propelled implements of husbandry, implements of husbandry or any combination of them that exceed 23 metres in length, 2.6 metres in width and 4.15 metres, including load, in height.[22] When the movement of over-dimensional farm vehicles on public roadways is necessary, the provisions outlined in section 96 (2)a, b, and d of the Highway Traffic Act must be followed. These, in brief, require the use of escort vehicles, special markings, flashing lights and other precautions aimed at protecting persons using the road from injury and property from damage.

Consistent Enforcement of the Highway Traffic Act - Although there needs to be clarification of the specific requirements in the areas noted above, there does not appear to be a need for additional regulation of farm vehicles on public roads. The information presented to the Task Force suggests that the principal requirement is for conscientious and consistent enforcement. Enforcement practices not only vary from one part of the province to another but between officers in the same area. Failure to ensure that all farm vehicles using public roads carefully observe the same set of rules may lead to carelessness in observance practices and conflicting information about what the rules really are.

The Task Force is aware that the Farm Safety Association and other industry agencies have been working on the problems of farm vehicle use of public highways and it does not wish to interfere in this process. However, its principal concern is that the existing regulations are clearly understood throughout the farm industry and that they be effectively enforced to ensure that the relevant accident records are improved. The Task Force believes that such a measure would substantially reduce the confusion and concerns that presently exist about farm vehicles on public roadways. In addition, continuing changes in farm transportation equipment and ways of working with it make it necessary that the regulations of the Highway Traffic Act be kept up-to-date with safety needs. Accordingly, the Task force recommends:

33. that the Ministry of Transportation and Communications in conjunction with the Agency prepare and issue explicit guidelines that will ensure

consistent understanding and enforcement of the Highway Traffic Act and its regulations on the use of farm vehicles on public roads in Ontario.

34. that there be a regular review of the relevance of the provisions of the Highway Traffic Act to farm vehicles every ten years and that the Agency be party to these reviews, the first of which should occur not later than 1987.

CHAPTER FIVE

CHEMICALS

Chemicals have played a role comparable to that of machines in changing farming methods in Ontario over the past four decades. They have also generated a high level of concern about occupational health hazards. The accident experience in using machinery has clearly demonstrated the need for protective measures, but the experience with chemicals and, more particularly, pesticides, remains shrouded in disagreement and concern about questions of exposure to them. These relate to rates of degradation of chemicals in different climatic conditions, lack of confidence in doctors' diagnoses of symptoms of acute intoxication, the difficulty of relating chronic and long delayed health effects to a specific cause and a lack of comprehensive exposure information on Ontario workers. Many warnings are given about the dangers of chemical exposure but, there is only limited information on the observance of good protective practices.

Ontario farmers use manufactured chemicals for many different purposes. Those brought to the attention of the Task Force as potential sources of occupational health and safety hazards fall mainly into the categories of crop protection materials (pesticides) fertilizers and pharmaceuticals. A few others such as disinfectants, detergents and sanitizers were mentioned, but no evidence of associated health problems was presented. Because much the greatest input to the Task Force had to do with pesticides, they are discussed at some length; the remaining issues are considered under the heading "Other Chemicals".

Pesticides

Extensive use of pesticides is an almost universal characteristic of modern farming. Over the past four decades the number of agricultural pesticides available has expanded severalfold and the amounts applied to Ontario crops have increased substantially. In 1983, 8.7 million kilograms of active chemical ingredients were used on field crops, fruit and vegetables grown in the province. This total was up from 6.6 million kilograms in 1978 and 5.5 million kilograms in 1973. The annual totals mentioned do not include pesticides used in nurseries, greenhouses and mushroom growing or in barns and other outbuildings. The pesiticides on which statistical data are collected in Ontario include herbicides, insecticides, fungicides, fumigants, nematicides, rodenticides, repellants and certain growth regulators.[1]

Table 8 shows that corn accounted for 43.6 per cent and tobacco for 26.0 per cent of the pesticides used in Ontario in 1983. Although only 6.5 per cent of the total was applied to fruit crops in that year, the amount used per hectare grown was 19.8 kilograms. This rate of use was second only to that on tobacco crops, where it was 55.8 kilograms per hectare, a substantial part of which is applied to the soil at the time the tobacco crop is planted.

Table 8
Area Grown and Sprayed, and Quantities of Active Ingredients of Pesticides Used on Field Crops, Fruits and Vegetables, in Ontario, 1983

Crop	Area Grown	Area Sprayed	Total Pesticide	% of Total Pesticide
	- '000 ha -		tonnes	
Corn	1,052.0	1,039.4	3,798.5	43.6
Soybeans	364.0	361.1	1,281.9	14.2
Dry Beans	32.0	31.5	59.8	.8
Tobacco	40.5	40.5	2,259.1	26.0
Grain*	852.0	535.1	376.3	4.4
Hay & Pasture	1,720.0	32.7	24.9	4.4
Fruit	28.4	N/A	562.7	6.5
Vegetables	72.9	N/A	356.0	4.1
TOTAL	4,161.8	N/A	8,719.2	100.0

* Includes winter wheat, oats, barley and mixed grain.

N/A - Not available.

Source: Ontario Ministry of Agriculture and Food, Survey of Pesticides in Ontario 1983.

Nature of Health Concerns

The health and safety issues associated with the use of pesticides in farming arise from the known toxicity of the chemicals and uncertainty about their long-term effects on human health. An acute pesticide exposure may be in the form of immediate toxic effects or an impairment of health delayed until after a latency period, which may be years in duration. The acute reactions are normally in response to a relatively heavy exposure and the symptoms, at least the immediate ones, are understood and fairly easily identified. On the other hand, the adverse health consequences of continuing or intermittent low-level human exposures have not been determined with certainty for all pesticides in use, but they are likely to be progressive and usually are irreversible.

Before a pesticide is registered for use in Canada, its manufacturer must explore both the immediate and the long-term consequences of exposure to it. It is by this process that the effects of acute exposures are defined and understood. We are less comfortable about our understanding of the longer term health effects of some pesticides for two reasons. First, the process of making these determinations are complex and may take years to complete. Second, most experimentation to determine both the toxicity and potential health effects relies largely on work done on laboratory animals and extrapolation of animal response data to humans. These animal experiments frequently involve extremely high doses of the pesticide being tested. In worker exposure the dose or amount actually absorbed per unit of body weight is likely to be much lower than that which occurs in laboratory tests. This leads to controversy about the validity for humans of the test animal response data. However, where there is evidence in animals that a pesticide is carcinogenic or is likely to contribute to neurological, reproductive or other disorders, the presumption is that the negative effects on animals will also occur in humans. In these instances the pesticide is not registered for use in Canada.

In the amounts to which people are likely to be exposed in the ordinary course of work, many pesticides in common use on Ontario farms have low-level, if any, immediate toxic effects on workers. On the other hand, many others, also in common use, are moderately or severely toxic and warrant caution in handling or otherwise making contact with them. The situation is further complicated by the fact that some of the less acutely toxic pesticides have been shown to be those that have the most serious chronic health effects.

In farming, contact with pesticides is likely to occur in the transport, storage, mixing and loading, application and disposal of them or while working in fields or handling produce too soon after pesticides have been applied. A detailed explanation of how exposure is most likely to occur and the appropriate protective measures in the various work activities mentioned is given in Appendix 6. (Readers of this report who are not fully familiar with the use of pesticides in Ontario should read Appendix 6 as an integral part of this section.) The Appendix is an extract from Background Paper Number 3, Agricultural Chemicals and Farm Health and Safety, prepared for the Task Force by the Canadian Centre for Toxicology.

Because the toxicity of registered pesticides is reasonably well understood, it is practical to design related protective measures. The difficult health and safety problem is how to ensure worker awareness of the seriousness of these toxic effects and of the need to observe the protective measures recommended. If well and fully understood, these measures should give adequate protection in all but the most serious emergencies.

Protection against chronic health effects of pesticides may be more complex than it is for acute poisoning. The facts that cause and effect are not so immediately and clearly related and that symptoms of health impairment usually appear gradually over extended periods of time contribute to this complexity. The result may be not only worker unwillingness to take protective measures but a total lack of awareness of the need to do so. This occurs because many pesticides "can be tolerated at quite high dose with little in the way of distinct symptoms of toxicity. This tends to breed a more casual attitude to their use and handling and is cause for concern in the use of those compounds which may have chronic effects".[2]

In addition, there is concern that the best protective measures available will not prevent pesticide exposure to the extent that long-term health impairment can be totally avoided. The view expressed in the Background Study is that "as a consequence of normal farming operations, it is inevitable that farm workers will be exposed to pesticides".[3] This position is supported by Dr. Richard Frank, Director of Agricultural Laboratory Services for the Ontario Ministry of Agriculture and Food, who, in a recent speech stated "If you handle chemicals they will get in your body. The only way you won't get it in your system is to get somebody else to spray for you."[4] These comments suggest that protective measures that prevent immediate poisoning may be less than adequate to avoid long-term health effects. There is increasing evidence that the human body will tolerate small doses of some chemicals for a long time but that there are threshholds at which the defence mechanisms cease to function and health impairment, perhaps irreversible, becomes evident. Accordingly, the protection needed may be more than that which prevents headaches and nausea today.

Evidence of Concern

There are almost no reliable data that document the nature and extent of either acute or chronic illness caused by pesticides among Ontario farmers and farm workers. While some cases are seen in doctor' offices and the emergency departments of hospitals, and others may be admitted to hospitals, no records are available that relate these instances to occupations. At the same time, because of differences in climate, crops grown, crop cycles and farming practices, data that describe the injury and illness consequences of pesticide exposure in other jurisdictions may be of limited relevance in assessing the experience in Ontario. For example, farmers in Alberta use small amounts of insecticides but are major users of moderately toxic herbicides, while in California large quantities of almost all types of pesticides are applied over a growing season that may accommodate up to four crops per year. However, if data from these areas identify problems, they probably tell us in Ontario that it is wise to exercise caution and that we need to develop better information on our own experiences.

The lost time injury statistics released annually by the Ontario Farm Safety Association show chemicals and gases as the source of only one per cent of the totals reported for agriculture in each of the past three years. The numbers were: 27 in 1982, 26 in 1983 and 29 in 1984. As already explained in Chapter Two, these data, which are derived from Workers' Compensation claims, are unlikely to be representative of the total lost time injury experience of the people who do farm work. They make clear, however, that chemicals and gases are a relatively minor source of the allowed lost time injury claims filed with the Ontario Workers' Compensation Board by hired farm workers. A recent survey indicated that 17 per cent of approximately 300 Ontario farm operators reported being ill at least once after using pesticides.

Anecdotal information, received by the Task Force, shows that Ontario farmers and farm workers experience both acute poisonings and impaired health from pesticide exposure. Several briefs claimed knowledge of "many instances" of workers experiencing headaches, dizziness, nausea and other symptoms of contact with pesticides while working in situations of known or potential exposure to them. The briefs making this claim base their conclusions on information collected by means of rather informal survey work that involved fifty-four visits to mushroom, fruit, vegetable and tobacco farms and greenhouse operations. Reports from individual workers gave first hand accounts of pesticide poisoning experiences and describe the situations in which they took place. One told of a serious poisoning of a farmer that has had lasting health effects. Another reported that up to fifteen student workers were exposed in a variety of different situations arising out of extreme carelessness both in handling pesticides and in managing staff on the farm on which they were employed in 1984. Third, individual exposures were described in a 1979 survey done by the Middlesex County Farm and Home Safety Council.

The Province of Alberta has explored the question of acute pesticide toxicity among farmers more systematically than it was possible for the Task Force to undertake in Ontario. A survey carried out in 1983, and based on a carefully selected random sample, contacted 488 farmers.[5] One of the important conclusions drawn from it was that in any one year about ten per cent of the Alberta farmers who use pesticides (approximately 5,000) believe they experience symptoms of pesticide poisoning. The majority of this number described moderate symptoms that lasted from several days to weeks. However, only one out of five of the farmers reporting symptoms sought medical attention, mainly because they felt they were not sufficiently ill to require it.

While the statistical and anecdotal information on the toxic effects of pesticides suggests that the experience in Ontario may not be particularly severe, it leaves most questions about this experience unanswered. The only conclusion that can be drawn with certainty is that better quality information on that experience is needed and that it should comprise a major component of the work proposed in Recommendation 6. Some of this work needs to be undertaken in the form of epidemiological monitoring.

Despite the paucity of reliable statistical information, more than two-thirds of the briefs submitted to the Task Force made some reference to farm chemicals. Almost all of these mentioned the need for protection against pesticide poisoning. In a few the input was merely a notation of concern, but most submissions suggested action to ensure safe use of crop protection materials. The proposals emphasized include more informative and readable labelling; standardization of measurement, with detailed guidance on conversion between the metric and imperial systems; attention to sanitation; the availability and consistent use of protective clothing; and care in the storage and disposal of pesticides. The extent of this input made it clear that the farm community views care in handling pesticides as a high priority in protecting farmer and farm worker health and safety. The weight of this view is increased by the fact that it was present in the briefs of practically all interested groups and, notably, in those of marketing boards, commodity associations, federations, individuals and advocacy groups.

In neither the farming community nor the opinions of experts in the area is the problem of acute toxicity viewed as being unmanageable. The report prepared for the Task Force by the Canadian Centre for Toxicology recognizes that "regulations governing the availability of pesticides to agriculture in Canada and Ontario appear to be satisfactory", but it also notes that "excessive exposure does occur through misuse and negligence". It goes on at considerable length to discuss the nature and resolution of these misuse and negligence problems, and it makes clear that farm workers need not suffer acute poisoning from the pesticides used in Ontario. To ensure that they do not do so, the report concludes that there needs to be much more careful observance of the protective measures already recommended by regulatory agencies, the Ontario Ministry of Agriculture and Food and the manufacturers. Full farmer and worker awareness of the risks taken when protective measures are ignored is seen as the major means of resolving the problem.

Because of what is already known about the carcinogenic, neurological and other health consequences of chronic exposure to some pesticides and also the possibility that others will be shown to have similar characteristics, it may be in this area that the more serious challenges of work related health and safety protection lie. The studies suggest further investigation of chronic exposure and the development of information systems that will provide a basis for such investigation.

The Task Force believes that all practical measures should be taken on a day-to-day basis to limit exposure to farm pesticides. With respect to acute toxicity, the priorities are to ensure that the hazardous properties are understood and that the work activities associated with their use are consistently carried out in ways that minimize exposure. As for the chronic or long-term effects, better information about cause and effect relationships must be developed for each pesticide having a potential for impairing human health. The results of the risk benefit analysis must be evaluated as they relate to the logical use of a pesticide for advancing agriculture. Until this better information is available, the emphasis has to be on improved protective measures and careful observation of them for both chronic and acute exposures. This is the case even if acute toxicity is not considered a serious problem. In light of the above the Task Force recommends that:

35. the Agency develop and mount a program that will ensure farmer and farm worker awareness of the hazards associated with pesticides and of the need for vigilance in following protective measures.

Control Framework and Proposed Protection

Ontario pesticides are used within an already extensive framework of regulations and information programs. These programs will be summarized briefly in this section and deficiencies in protection that particularly concern the Task Force will be discussed.

The first steps in the regulatory process occur at the federal level of government, under the authority of the Pest Control Products Act. It requires that all pesticides be registered before they are sold or used in Canada. The registration process involves several departments of government in a detailed assessment of the efficacy, toxicology, metabolism, residues and many other characteristics of the product in question. If the conclusions are positive, the product will be registered and the conditions under which it may be sold and used, defined. These conditions must be specified on the labels on pesticide containers and include restrictions on the use, storage and disposal of the product.

Several provinces rely fully on the federal regulatory program but in Ontario the Pesticides Act further controls the sale, use, display, storage and transportation of pesticides. This control is achieved through a classification of registered pesticides with the intention of restricting access to users who clearly need them and who have the training and knowledge to use them correctly. Consistent with this approach, the Act requires vendors and commercial applicators of pesticides to be licensed and specifically regulates pesticide transportation, storage and disposal. No license is required by an "agriculturist" using pesticides on his own farm. In all but emergency situations, the present administration of the Act leaves observance of the performance regulations almost entirely up to the user, that is, there is no active enforcement program except where complaints are received or serious problems are identified.

The basic components of the information program are the label, the Pesticide Safety Handbook, published by the Ministry of the Environment, recommendations pertaining to fruit, vegetables and field crop production and the Guide to Chemical Weed Control, which are revised annually by the Ministry of Agriculture and Food. These documents give extensive and up-to-date information on the proper use of pesticides on farms. They are supplemented by occasional material released by the two ministries and the Farm Safety Association, the work of the county agricultural representatives and courses or seminars put on by the colleges of agricultural technology. In addition, the pesticides manufacturing industry, through company representatives and the Canadian Agricultural Chemical Association, instructs its dealers in pesticide safety. This is done with a view to the information being passed on to the farmers by sales personnel. The Association also contributes to the seminars and courses put on for dealership and farm personnel at the agricultural colleges and provides a number of other courses, including one on metric measurement.

If the regulations that are already in place were consistently observed and the information that is already available known and understood by all farmers, there should be little, if any, concern about farmer and farm worker exposure to pesticides. However, in situations in which thousands of people are involved, it may be impractical to expect that either consistent observance or high levels of understanding can be achieved through an almost wholly passive process of regulatory guidelines and comprehensive, but low-key information programs. Almost certainly the major source of the concern lies in ensuring farmer and worker understanding of the health and safety risks associated with pesticides and their readiness to take the initiative in limiting these risks.

The Task Force recognizes the difficulty of preventing pesticide exposure. For this reason it believes that greater emphasis should be put on awareness of its hazards and on encouraging farmers and others to take all practical protective measures. Accordingly, the remainder of this discussion will deal with actions that, if taken, seem most likely to achieve the level of protection deemed desirable.

Labelling

A recurring theme in Task Force discussions at its public hearings was that improved labelling of pesticides would substantially increase care in their use. Related concerns ranged from size of print to inadequate information on the labels. The matter about which most dissatisfaction was expressed was complexity or ambiguity of statement. The requirement is for simple, easy to read, step-by-step instructions that specify how the product should be used, the symptoms of misuse and the action to be taken if an accident occurs. One of the principal complicating factors is that directions sometimes are stated in metric only. The solution is seen as a formal requirement that both metric and imperial measurements be used on all labels.

The Task Force agrees that clarity in labelling is important. However, it has not had the time or resources to explore the issues raised with respect to labels in a manner that will permit it to make recommendations on what specific changes are required. Accordingly, it recommends:

36. that the Agency take the lead in:

- obtaining more precise information about the problems farmers experience in reading pesticide labels;
- preparing a set of specific recommendations for improving the health and safety content of labels on pesticides used in Ontario; and,
- working out the necessary changes in labelling practices with the responsible provincial and federal authorities.

Pesticide Storage and Container Disposal

Both of these areas are covered by regulations made under the Pesticide Act. The storage regulations appear to be adequate, but there is known to be some lack of observance of them. One brief pointed out that pesticides in the form of powders were stored in a room adjacent to the employees' lunchroom and, sometimes, in the lunchroom itself. Such practices are clearly not acceptable and are almost certain to result in some degree of exposure. The Fruit and Vegetable Growers' Association, Flowers Canada and some county safety associations felt it necessary to emphasize in their briefs the need to store pesticides away from such facilities as lunchrooms and animal feeds and to ensure that they were under lock and key.

Although disposal of pesticide containers is regulated in Ontario, the matter remains an active concern in the farm community. Major product groups and individuals discussed the problem with the Task Force and appeared to favour training as the most effective means of improving performance. Also, some clarifiction of procedures may be required.

The Task Force is convinced that pesticide containers should be rinsed three times, punctured and incinerated. The rinse water should be emptied directly into the spray tank. The Task Force believes that burying used containers is already a limited practice in Ontario and one that should be discouraged. It also believes that returning containers to the manufacturer would lead to misuse and higher costs. It recommends:

> 37. that the pesticide container disposal method used in Ontario be puncturing, triple rinsing, incinerating and then disposal in an approved municipal land-fill site.

Re-entry

The time that should elapse after a field is treated with a pesticide before workers re-enter it may or may not be specified on the product label. The farmer is required by regulation to comply with the instructions on the label, but where these are not specific, disagreement and confusion may arise.

Careful observance of re-entry requirements is not only sound health and safety practice but would meet several of the major concerns expressed in employee protection oriented briefs presented to the Task Force. Re-entry regulations have been used in California since 1971 and have been in United States federal law since 1974.[6]

The Task Force feels it is essential that specific re-entry times be adhered to and that common sense be used in asking people to work close to spraying or dusting operations. Its views are that most farm operators are conscientious in this matter and that those that are not are unnecessarily creating tensions in the farm work force that can damage the whole industry. Accordingly, if a pesticide for which the label does not specify re-entry times is used, the Task Force believes that farm operators should be required to comply with the re-entry recommendations for fruit, vegetables and field crops published each year by the Ministry of Agriculture and Food.[7] The Task Force recommends:

38. that it be mandatory that farmers and farm workers observe as a minimum interval between the time of application of a pesticide and the time of next working on the crop, the greater of the re-entry period specified on the product label or that set out in the Ministry of Agriculture and Food Production Recommendations for the year and pesticide in question.

Availability of Protective Equipment

No aspect of pesticide protection received more attention than the difficulty farmers have in finding the protective equipment they need to handle pesticides safely. Their strong preference is that a full line of such equipment appropriate to the chemicals sold be available from licensed pesticide dealers. At present, dealers do not always display, and sometimes fail to carry, the protective equipment recommended for use with the pesticides they sell. The result is that farmers are required to spend time attempting to locate the hats, gloves, eye protectors, respirators and other clothing and equipment they need, or, as is often the case, they get on without them.

The Task Force is of the view that better availability of protective equipment would significantly increase the extent to which it is used. It recognizes that it is the farmer's responsibility to ensure that he has the equipment necessary to the pesticide applications carried out on his farm. However, as one brief observed, "If it is not readily available, farmers will not make the effort to get it". In addition, the Task Force believes that initiatives should be made to ensure that protective equipment is conveniently available at reasonable prices. In this latter connection, some excellent European equipment is not for sale in Canada because it is not approved by the National Institute for Occupational Safety and Health (NIOSH) in the United States. Canada relies on NIOSH approved equipment because it has no testing agency of its own.

The Task Force recommends:

39. that the testing of work protective equipment for use in Canada be undertaken by the appropriate Government of Canada agency;

40. that a requirement be written into the Pesticides Act making it necessary for licensed vendors to carry, display and promote protective equipment appropriate to the pesticides they sell under schedules, 1, 2, 3, and 5 of the Ontario Classification of Pesticides.

Use of Protective Equipment

Farmers and their hired workers frequently fail to observe the protective equipment recommendations made available to them on pesticide labels and in the manuals provided by the Ministry of the Environment and the Ministry of Agriculture and Food. It is common knowledge that these practices are widespread. They are confirmed by the briefs presented to the Task Force and by the report of an Alberta survey of farm pesticides conducted in 1983, which states that "35 per cent of the farmers wear no extra protective equipment at all"[8] when handling pesticides.

The principal reason given in both Alberta and Ontario for not using protective equipment is that it is uncomfortable. This is especially true of respirators and facemasks. The availability problem, already mentioned, is also an important factor and so is the cost of the equipment. However, an attitude that wearing protective equipment is not important seems to be the critical factor in this matter. Almost every farmer contacted by the Task Force could cite instances of people applying pesticides while the masks, gloves and other protective devices they should be wearing were lying unused in the workshop or barn. Surveys confirm this practice.

The failure to use protective equipment is viewed as the most serious cause of acute pesticide poisoning and, in the light of the present state of knowledge of chronic health effects, as an absolutely essential part of protection against them. Accordingly, the Task Force recommends:

41. that the use of protective equipment as specified on pesticide labels be made mandatory when handling such products and that farmer observance of the regulation be monitored to a sufficient degree to ensure that it is widely practised.

Medical Services

Medical treatment of acute pesticide poisoning on farms appears to be difficult to obtain in Ontario. Background papers prepared for the Task Force, as well as briefs from commodity associations and others underscore this problem, which appears to have two dimensions.

First, many doctors do not seem to be prepared to diagnose any but the most severe cases of pesticide poisoning. Even where evidence of pesticide exposure is available, mild or moderate symptoms of such illness are typically identified as the flu or the results of too much sun or bad food. The fact that this concern was brought to the attention of the Task Force by many different sources suggests that it is a serious one.

The second aspect of the problem is the lack of confidence in the capability of the Poison Control Centres to provide treatment information when called upon for assistance. This appears to arise from some communication difficulties because the Centres have access to the most up-to-date information in Canada on the treatment of pesticide poisonings. However, the Task Force recognizes the urgent need for this information to be readily available to doctors and nurses throughout the province and recommends:

42. that health professionals be trained in the effects, diagnosis and treatment of pesticide exposure as part of the work they do to qualify for their profession;

43. that health professionals be assured of immediate telephone access through the Poison Control Centres to treatment information on all pesticides registered in Canada and the Agency serve as a clearing house for correcting access problems.

Existing Protection

The Pesticides Act almost certainly brings about better control of pesticides in Ontario than would exist if the province did not have this legislation supplementing that at the federal level. Nevertheless, it is administered on the assumption that once informed, people obey the law, an approach that is not satisfactory to some persons interested in the problems the Act is intended to regulate.

Regulations made under the Pesticides Act set out proper transportation, storage and container disposal procedures and require observance of safe practices in the application of pesticides, but there is no ongoing enforcement of them. The reason given for this is that staff is not available in the Ministry of the Environment for monitoring work. The people who might undertake inspections are fully occupied with emergencies of greater public concern, complaints or other Ministry work. Some evidence came to the Task Force that even legitimate and urgent complaints of farmers and farm workers are not sufficiently high on the priority scale to get prompt attention. It took several months of repeated contacts and referrals between various government agencies before the serious concerns of students working in a vineyard in 1984 were attended to. Since farm work problems change rather quickly with crops and seasons, an enforcement arrangement that has to debate where the responsibility for action lies when urgent problems arise is not an adequate one. The Task Force recommends:

44. that the enforcement of the Pesticides Act be reviewed and strengthened to ensure that the farm health and safety aspects of the program are effectively handled.

Other Chemicals

Relative to pesticides, only limited concern was expressed to the Task Force about health and safety hazards of other chemicals brought onto farms. However, some potential hazards warrant attention and are noted below.

Fertilizers

More than one million tonnes of fertilizers are used in Ontario annually. Fertilizers are generally understood to be commercially obtainable products that contain one or more of the three essential elements, nitrogen, phosphorous and potassium. They are prepared in forms which, when applied to the soil, permit crops to use them in the processes of growth. Mixed dry fertilizers, the major volume products used on Ontario farms, are safe to handle and are applied to the soil by granular fertilizer applicators.

Chemical fertilizers are applied in liquid, granular and gaseous forms with application machinery such as sprayers, granular applicators and equipment especially designed for releasing materials in liquid or gaseous forms. Mixed fertilizers do not present health problems associated with the chemical characteristics of the materials, but the machinery used for applying most materials have been assigned medium hazard ratings of "4" or "5" (See Appendix 5) in the study prepared for the Task Force by the Ontario Centre for Farm Machinery and Food Processing Technology.

Anhydrous ammonia requires special attention. Large quantities of this product are sold directly to farmers as a concentrated nitrogen source. Under normal temperatures and pressures ammonia is a gas, and when cooled to -33°C, it becomes a liquid. When liquified anhydrous ammonia under pressure is released to the atmosphere, it expands rapidly to about 850 times its original volume. Ammonia is a strong irritant. Exposure to the liquid or high concentrations of the vapour may cause blindness or severe burns, and inhalation of the vapour will damage mucous membranes and lung tissue. Anhydrous ammonia applicators have been assigned a hazard rating of "10", the highest rating in the scale prepared by the Ontario Centre for Farm Machinery and Food Processing Technology.

A survey conducted by the Middlesex County Farm and Home Safety Council revealed the following user experience related to anhydrous ammonia. It includes leaky valves in distribution equipment, skin burns, nausea from fumes, loss of eyesight, chest pains and dissatisfaction with equipment provided by distributors for farmers' use. The survey did not indicate the frequency of accidents, but the injuries associated with the accidents that do occur are severe, and the utmost caution is indicated.

Information prepared for the Task Force on the use of fertilizers on Ontario farms and their relation to health and safety[9] states that the volume of anhydrous ammonia applied directly to the soil is approximately 60,000 tonnes per year. It notes that ammonia may be delivered either by a commercial carrier to a distributor or directly to the farm customer. The standard container for delivery to a farm is a nurse tank, containing about two tonnes of the liquid product, which the farmer tows behind a car, truck or tractor to his field. As an alternative, a pressure vessel mounted on a wagon or trailer may be used.

For application the ammonia may be transferred to a second pressure tank or an applicator-type cultivator or it may be released directly from the nurse tank through the use of tool bars, which place it in the soil. The ammonia is released 15 to 20 centimetres below the surface when the tank is at full pressure. If the pressure in the tank is reduced, this depth may be reduced. The empty nurse tank is returned to the depot for refilling and the cycle is repeated.

The study notes that approximately one-third of the accidents associated with the use of ammonia occur in the field and two-thirds during transit to the farm. However, examination of transit accidents reveals that the chemical nature of the product may not be as important in causing them as the mechanical design and maintenance of the vehicles used. In the author's view, a lack of training in good safety practices and in the use of personal protective equipment greatly increases the number of injuries associated with anhydrous ammonia. This observation is made despite the fact that the fertilizer industry devotes considerable effort to the education and training of farmers in the safe use of its products. Training sessions are held each year and, in 1984, approximately 300 people attended courses in Ontario on the safe handling of anhydrous ammonia. The staff for the training sessions are skilled individuals and technically competent leaders in the fields of safety equipment, maintenance, product knowledge and technical service. The students are managers, salespeople and operators of fertilizer businesses. Those who attended the courses conducted an estimated 150 individual farmer training meetings during the spring of 1984.

In summary, anhydrous ammonia is a commonly used source of nitrogen in Ontario. Ammonia is a highly reactive alkaline chemical and, if not handled properly, can cause severe damage to eyes, respiratory system and skin. The anhydrous ammonia in shipping containers and storage tanks is under pressure, which increases the risks associated with handling it. However, it can be handled safely if the operator or handler has a knowledge of its properties and follows recommended safe handling methods and if the distribution equipment is in good condition.

The Task Force recommends:

45. that the safety aspects of the distribution and application of anhydrous ammonia be studied by the Agency and, if required, appropriate controls be developed and implemented.

46. that the Agency work with fertilizer suppliers and commodity groups to ensure that training on the properties, safe handling and emergency treatment of anhydrous ammonia exposure is available and promoted among farmers and farm workers.

Pharmaceutical Chemicals

Over 2,000 pharmaceutical products are used in farming. They can be classified, according to their use, into therapeutic and production drugs. In general, therapeutic drugs are sold in the form of injectables, oral boluses, drenches or water medications. Production drugs are usually administered in medicated feed. They are used to prevent animal diseases that commonly occur on Ontario farms and that may inhibit animal growth or productivity. The concentrations of drugs used in this way vary from two to 200 grams per tonne of feed; however, the medication may be continued for long periods if high levels of disease susceptibility are indicated. At lower concentrations, the same drugs are administered to promote growth. Such use is most common among very young animals.

According to a background paper[10] prepared for the Task Force on the use of pharmaceuticals on farms, the likelihood that veterinary products in the form of boluses or injectables would produce harmful effects in those involved in their handling and administration is almost negligible. Occasionally, an operator may accidentally inject a small quantity of a drug into his own tissues, but the production of anything more than a transient local lesion is unlikely except in the case of hypersensitive individuals.

The areas that may present potential hazards are the preparation of water medications and the mixing and storage of medicated feed, where workers may experience skin and respiratory contact with small amounts of a drug. The consesquence of this may be development of toxic or allergic symptoms. In addition, there is concern regarding the effects of transmission to livestock handlers of bacteria harmful to man that have been made drug resistant by prolonged feeding to animals of medicated feed containing antibiotics.

The background paper notes that the various government agencies controlling the sale and use of drugs for animals do not have regulations protecting farm personnel from related hazards. There are very few reported cases of farm workers suffering adverse health effects from using animal drugs. However, the author notes that the allergy susceptibility of the public to such drugs as penicillin suggests that the incidence of occupational allergic diseases in farm personnel may be higher than reported.

Much of the potential problem could be addressed by giving improved educational material to the agricultural community. Warnings on labels of products used for mixing in feed and water and the use of facemasks where there is a risk of inhalation of the drug is recommended. In addition, the accumulation of health experience data through surveys and treatment agencies would provide information on farm worker health experience relating to the use of drugs on animals.

Conclusion

As noted at the outset of this chapter, the Task Force has not explored all aspects of work health and safety associated with chemicals brought onto farms. It believes it has addressed the concerns most in need of attention and that its recommendations offer a balanced approach to health and safety protection relative to them. However, practically all of the problems noted need further observation and analysis.

CHAPTER SIX

HUMAN FACTORS

A memorandum on health and safety in agriculture prepared for the European Parliament in 1976 contains the following passage.

> "By virtue of the very nature and variety of the work involved in agriculture, farming must be considered as a high-risk occupation and the accident statistics are there to prove it. But accidents do not happen, they are provoked! Indeed, the great majority of accidents are found to be caused by unsafe acts by persons."[1]

That this view reflects the situation in Ontario is indicated by the Farm Safety Association's descriptions of two recent farm work related fatalities.

- Victim was working under the bucket of a raised hydraulic loader without it being blocked or supported. He was crushed to death by the filling mechanism which fell on him when two hydraulic hoses were disconnected:
- Victim was operating a tractor and sprayer. He dismounted the tractor to check the sprayer pump leaving the PTO engaged. His coat became caught in the spinning PTO drive, which pulled him into the drive unit where he died of strangulation.[2]

In these and many other instances the worker placed himself in an unsafe situation and paid severely for doing so. The question posed to the Task Force is what measures can be taken to prevent or limit such unsafe or unhealthful behaviour.

Many personal and social factors impact on farmer and farm worker occupational health and safety. Important among them are knowledge and experience of both the task and the tools or equipment used for doing it, skill levels attained, alertness and basic attitudes toward work performance. Where work is done in a tense or uncongenial social or physical environment there is a potential adverse influence on health and safety which is likely to express itself in stress or actions governed by frustration. It is when inadequate experience and skill, rashness and hostility are combined with the use of powerful machines, obstinate animals or untidy maintenance shops or yards that excessive risks are taken.

How farmer and farm worker behaviour interact with farm plant, equipment and products to cause health and safety problems is too extensive a subject for the Task Force to address further. That such interaction is related to worker health and safety is not in question. Also, the relative freedom of farm work and a farm's varied environments may increase the range and importance of this interaction as compared with work done in other industries. In many of them, workplaces are more confined and personal behaviour more carefully controlled by supervision, the nature of the task and the work station itself. Accordingly, worker behaviour and working conditions that contribute to accidents and illness on farms are as much the subject of this report as are the unsafe characteristics of machines or buildings.

The Task Force is supported in this view by the input it received from the farm community. In particular, the emphasis that this community places on education as a means of protecting farmers and farm workers against health and safety hazards suggests that voluntary modification of worker qualifications, attitudes and practices is the most promising route to improved health and safety performance on Ontario farms. Some circumstances that give rise to health and safety problems, which should be corrected by well focused education, were brought clearly to the attention of the Task Force and are essential components of its assessment. They will be discussed in terms of work skills, hours, sanitation, worker representation and stress.

Work Proficiency

The varied and complex nature of farm work in Ontario is recognized. In addition, the tasks and activities of which it is composed have changed greatly in recent decades. The shift to almost universal use of electrical and mechanical power, more specialized and intensive production practices, greater use of expensive machinery and a stronger market orientation has significantly altered the mix and kinds of skills required to operate farms in Ontario from those required twenty-five or more years ago. In some respects, these changes may have reduced the number of tasks to be done, but they have almost certainly, increased the urgency and complexity of those that remain and the proficiency levels needed to perform them.

The more problematic aspects of this shift in the skills demanded in farming were presented to the Task Force by a dozen or so individual farmers, who discussed their work at the public hearings. These people have little or no hired help and find their time and energy severely taxed by the things that have to be done in any day or season. For them to be highly proficient in all of the skills they require seems to be out of the question. A farmer who is also a trained equipment mechanic stressed the importance of expert machinery maintenance to the efficient and safe operation of his own farm. He also underscored the critical need for farmer and employee operators to understand the performance specifications of the equipment they use. Those farmers who cannot achieve the level of skill and understanding that is necessary for machinery maintenance and operation either accept the costs of obtaining high quality maintenance services and training or the risks of "making do" with less.

The question that emerges is whether or not worker preparation in farming has kept pace with the evolution of farming processes and technology. The predominance of machinery and special equipment-related fatalities and injuries may indicate that the two factors are out of step. The Task Force has no conclusive evidence that this is the case but it is concerned that a lack of understanding and skill proficiency contributes significantly to farm health and safety problems.

Traditionally, farming skills have been learned through an experience based process in which, over a number of years, they were passed on from one generation to the next. While slow rates of technical innovation prevailed, there was little need for other training approaches because the flow of new information necessary to effective farm operation was small. As an outgrowth of this long standing situation, the farmer and farm worker is "deemed to know" what is required to undertake any task that arises on the farm. This view, although moderated, is still prevalent and gives rise to strong resistance to almost any suggestion that formal qualification be made a condition of any aspect of farm work. As a consequence, in such high risk work as machinery operation and the use of chemicals a farmer may be exempted from the proficiency tests and licensing required of non-farmers doing the same work. The fact that such arrangements exist in legislation indicates the degree to which the "deemed to know" position is entrenched in Ontario.

A second consideration, already noted, is that the nature of farm work requires expertise in more skills than any one person is likely to master. The skills range from financial management, personnel management, production planning and marketing, through operation and maintenance of machinery, crop production, animal handling and a host of others. Modern production methods have so changed farm work that higher-level skills are demanded, and full proficiency in them is necessary to work safely. The Task Force believes that there may be wide variation in the proficiency levels attained by farmers and other farm workers. Thus, access to appropriate training is a priority need.

Proficiency training in farm work skills is available through experience on the farm, information supplied by dealers in equipment and supplies, farm organizations for young people and, on a more limited basis, colleges of agricultural technology. Many specific training needs are met by supplier salesmen, who although they may have limited time to spend on the training of customers, are in the view of the Task Force, generally well informed and competent.

Nevertheless, for a buyer who is not at ease in acquiring new information, the supplier-based training system may be less than adequate. Even if the necessary operating and maintenance measures can be passed on in this setting, it is doubtful if it is one in which an appreciation of the care required to carry them out safely can be conveyed. The same deficiency may apply to written instructions with respect to some farmers and farm workers who have learning disabilities associated with age or other factors (See Chapter One, Page 20). In light of the recognized reticence of farmers to undergo training, questions arise about how effective the existing training arrangements are.

The concern about work proficiency expressed above is widely reflected in the briefs to the Task Force. Statements that indicate this follow:

- "Inexperienced operator unfamiliar with equipment should have access to tractor and equipment safety courses (one day)."[3]

- "We must realize we are working with part-time or seasonal people" who frequently lack experience.[4]

- "During the winter months, the Ministry of Agriculture should have on-the-job training sessions in the operation, maintenance, and trouble-shooting in tractors and machinery. These courses should be mandatory for farm workers, with Manpower perhaps paying these people for the time away from work."[5]

- "Compulsory courses are needed for under age drivers of tractors 12-16 years of age."[6]

Others reflected the same concerns, and place the responsibility for his own work proficiency on the farmer himself.[7]

Because of the importance of work proficiency in preventing accidents and illness on farms and the lack of reliable information on the matter, the Task Force recommends:

47. that the Agency, in conjunction with others with expertise in skill assessment and health and safety protection, give priority to exploring the work proficiency of people doing farm work and the ways of correcting deficiencies, if any, revealed by the study.

The foregoing comments on worker preparation relate mainly to farmers and permanently employed hired workers. A substantially different situation pertains to seasonal workers and, perhaps, some full-time workers on large farms. For these people, the skills required are, in many cases, relatively few and simple. The least capable person should, in most instances, be able to acquire them if given clear instruction. Although the Task Force heard some comments on the training of seasonal hired workers, the matter did not appear to be one of major concern.

Table 9 shows the types of lost-time injuries which hired workers generally experience on Ontario farms. In the period 1978 to 1982 more than 71 per cent of these workers' injuries were caused by falling, lifting, slipping or being struck by, or against, an object. This suggests that the need is for protection against the basic sorts of accidents that occur in physical work and that job training should take this consideration into account.

Whether or not the training is adequate is an open question. There is substantial evidence that work injuries are disproportionately high at the times of the year when most seasonal workers are employed. Figure 6

Table 9

Number of Lost Time Injuries in a Five Year Period, 1978 to 1982, Ontario, By Nature of Injury and Farm Enterprise

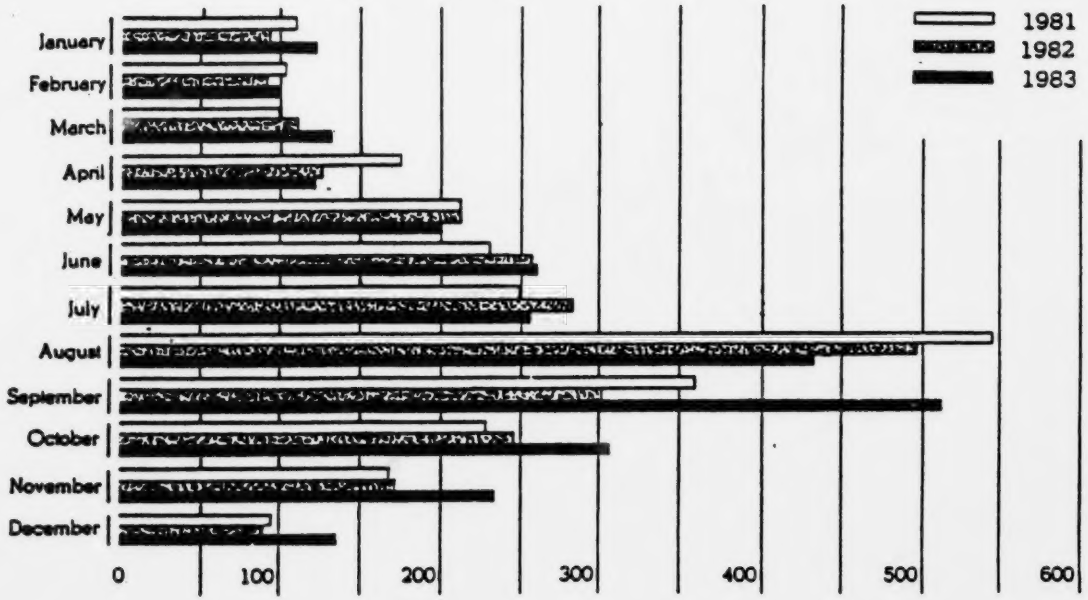
Farm Enterprise	Nature of Injury													Total	
	Strains, Sprains	Cuts, Bruises	Breaks, Fractures Dislocations	Eye Injury	Puncture, Wounds	Infections, Rash	Burns	Major Amputations	Tobacco Rash, Poison	Hernia	Minor Amputations	Gas, Chemicals	Heart Attack	Number	Proportion
	- number -													no.	percent
Nursery and Landscape	987	721	265	146	59	57	39	28	—	26	26	8	—	2362	21.5
Tobacco	802	714	323	41	53	35	46	25	146	35	21	2	1	2244	20.5
Fruit and Vegetable	479	456	230	75	22	37	16	27	—	21	14	13	—	1390	12.7
Mushroom	218	344	50	19	22	7	8	5	—	—	2	2	—	677	6.2
Greenhouses	175	174	52	26	19	26	11	2	—	5	1	12	1	504	4.6
Cash Crop	63	93	48	13	4	2	6	10	—	3	3	1	—	246	2.2
Sub-Total	2724	2502	968	320	179	164	126	97	146	90	67	38	2	7423	67.7
Dairy	305	325	266	31	39	14	9	28	—	17	13	9	3	1059	9.7
Poultry	237	195	58	32	26	14	11	3	—	11	3	3	1	594	5.4
Horses	115	153	86	7	4	5	4	2	—	4	1	—	1	382	3.5
Beef	131	174	111	21	17	4	8	16	—	5	3	2	—	492	4.5
Pork	48	70	32	7	18	4	1	2	—	—	3	2	1	188	1.7
Sub-Total	836	917	553	98	104	41	33	51		37	23	16	6	2715	24.8
Drainage	88	94	36	21	4	5	3	1	—	1	—	—	—	253	2.3
Other	155	217	94	16	16	10	14	23	—	3	13	3	3	567	5.2
Total-Number	3803	3730	1651	455	303	220	176	172	146	131	103	57	11	10958*	
Total-Percent	34.7	34.0	15.1	4.2	2.8	2.0	1.6	1.6	1.3	1.2	.9	.5	.1		100.0

Source: Farm Safety Association Inc., Survey of Agricultural Lost Time Injuries, Annual, 1978 - 1982.

*Deletion of injuries not classifiable by variables shown reduced the total below the 12,209 reported between 1978 and 1982.

Figure 6

Lost Time Injuries by Month
1981-1983



1983 figures provisional.

Source: Farm Safety Association.

shows that in the months of May to November, lost-time injuries among people covered by Workers' Compensation on farms are two to five times more numerous than in the period December through April. A comparison of average farm employment levels for the same periods in each of the three years shown in Figure 6 indicates that farm employment was greater in the period May to November than in December to April by 1.57 times in 1981, 1.44 times in 1982 and 1.52 times in 1983.8

The Task Force has no hard information to explain why the increase in lost time injuries in the months of high seasonal farm worker employment is so much greater than the increase in the farm labour force itself. No doubt a variety of causes shape this relationship, among which would be worker inexperience and long hours. However, it is clear from the lost time injury data in Table 10, which shows injuries by month and farm type, that tobacco, nurseries and landscaping, and fruit and vegetable farming contribute a major share of the lost-time injuries in the months when they employ large numbers of hired workers. This information does not alter the basic problem of disproportionate increase in injuries as compared with numbers of workers employed, but it does show that the major part of the high level of accidents experienced lies with seasonal workers and indicates where preventive measures need to be taken.

The Task Force is convinced that the relationship between skill proficiency and farm safety experience needs to be more fully understood. Any doubt about this will be allayed by noting the number and circumstances of fatalities reported by the Farm Safety Association caused by rearing tractors. Information presented to the Task Force about the programs of 4-H Clubs and Junior Farmers show that their programs are establishing the necessary connection between proficiency and safe performance. However, this training may not be reaching older farmers and hired workers, and the above discussion and data appear to indicate that it is not yet sufficiently focussed on seasonal workers.

Table 10

Number of Lost Time Injuries in a Five Year Period, 1978 to 1982, Ontario, by Month and Farm Enterprise

	Month												Total	
Farm Enterprise	January	February	March	April	May	June	July	August	September	October	November	December	Number	Pro-portion
						- number -							no.	percent
Nursery and Landscape	49	48	49	170	377	374	349	312	244	307	237	69	2585	21.2
Tobacco	20	27	33	42	91	111	137	1210	645	97	95	39	2547	20.9
Fruit and Vegetable	44	39	48	60	102	129	211	244	269	260	97	35	1538	12.6
Mushroom	60	59	47	76	70	67	45	60	87	53	76	70	770	6.3
Greenhouses	40	24	52	59	58	59	56	55	39	40	32	28	542	4.5
Cash Crop	20	12	6	18	24	14	26	36	39	37	18	11	261	2.1
Sub-total	233	209	235	425	722	754	824	1917	1323	794	555	252	8243	67.6
Dairy	90	69	88	69	76	136	149	133	101	90	88	88	1177	9.7
Poultry	60	53	58	46	47	50	44	73	51	73	67	58	680	5.6
Horses	18	25	26	29	46	41	64	49	34	53	19	19	423	3.5
Beef	33	29	39	31	48	47	62	53	39	67	44	37	529	4.4
Pork	18	19	10	16	14	14	25	29	17	10	22	13	207	1.7
Sub-total	219	195	221	191	231	288	344	337	242	293	240	215	3016	24.9
Drainage	7	8	3	10	28	34	42	26	38	39	41	11	287	2.4
Other	19	29	23	26	32	82	100	101	44	66	61	41	624	5.1
Total - Number	478	441	482	652	1013	1158	1310	2381	1647	1192	897	519	12170*	
Total - Percent	3.9	3.6	3.9	5.3	8.3	9.5	10.8	19.6	13.5	9.8	7.4	4.3		100.0

Source: Farm Safety Association Inc., Survey of Agricultural Lost Time Injuries, Annual, 1978 - 1982.

*Deletion of injuries not classifiable by variables shown reduced the total below the 12,209 reported between 1978 and 1982.

Work Time

In 1984 the average usual hours of work for full-time farm workers employed on farms in Ontario was 54.2 per week. This compared to average usual weekly hours of 41.5 in all industries excluding agriculture. In these industries the average weekly hours ranged between 39.1 in public administration and 42.6 in construction. The high average weekly usual hours in agriculture reflects the 43.8 per cent of full time workers in that industry who usually worked 60 or more hours per week.[9] The data are set out in greater detail in Table 11.

The same data source reports both actual and usual hours of work for paid workers only. The average weekly hours for full-time paid agricultural workers in 1984 were 49.4 (actual hours) and 50.2 (usual hours). The usual weekly hours of male full-time paid workers were 53.6, while those of females were 42.4. Four-fifths of the paid female full time agricultural workers reported usually worked 30 to 40 hours per week, while males in this category made up slightly more than a third of the male total reported. On the other hand, more than a third of the paid males had usual hours of 60 or more per week, and more than half had usual hours of 49 or more per week.

The data outlined leave no doubt that work hours are substantially higher in agriculture than in other industries. They also show that a high proportion of workers in agriculture, both self-employed and paid, work very long hours, that is, in excess of 60 hours per week. This is supported by statements in briefs to the Task Force indicating that 12 to 16 hour days are not unusual at planting and harvest times.

The health and safety effects of long hours were discussed in the public hearings by individuals, county safety associations, regional federations of agriculture, the Women's Institute and advocacy groups. The emphasis was almost invariably on fatigue and the increasing risk of accidents that may accompany it. Fatigue is induced by the duration, nature (bending, lifting, etc.) and conditions (noise, heat, dust, etc.) of physical work and by the individual worker's health or physical condition. In advanced stages it leads to reduced sensory and perceptual awareness, attention and response to external stimuli, all of which can make a worker accident prone.[10]

Table 11

Employed Full-time Workers in Agriculture
By Number of Usual Hours Worked
Ontario, Annual Averages 1984

	Total Employed Workers	1-29 Hours	30+ Hours	30-40 Hours	41-44 Hours	45-48 Hours	49-54 Hours	60+ Hours	Average Hours Worked
	- thousands -								
All Workers									
Both Sexes	98	4	94	32	-	5	13	41	54.2
Males	74	-	71	18	-	4	11	37	57.6
Females	24	-	23	14	-	-	-	4	43.5
Paid Workers									
Both Sexes	42	-	41	17	-	-	7	12	50.2
Males	25	-	25	9	-	-	4	9	53.6
Females	11	-	10	8	-	-	-	-	42.4

Source: Statistics Canada, Labour Force Survey, Special Tabulation, 1984.

Agreement with the view that fatigue increases the potential for accidents is well stated by two farmers who also work for wages on other people's farms. Their comments were:

- "When working with hired labour, remember that most people don't mind working hard but give a frequent rest break. The days when people get overtired, accidents happen."[11]

- "A large portion of farm accidents occur during harvest time when farmers are very busy, so busy that, often, rest periods are not taken. During my vegetable harvesting employment, I have sometimes only had ten minutes off of work in a twelve-hour day. This type of work environment wears a person's concentration level down to the point where accidents happen."[12]

A number of other briefs specifed concern about fatigue and its consequences. While some of these advocated controlling hours of work for hired workers on farms by legislation, there was general recognition that farm employment entails long hours. With that in mind, the major thrust was for considerate administration of them. In particular, the need for frequent and meaningful work breaks was stressed and, to a somewhat lesser extent, regularity in taking meals.

Briefs that spoke for hired field workers were especially concerned about the matter of considerate supervision. One noted that:

- "Because of the nature of much of the work which requires stooping, bending, and/or standing for many hours on end, women farm workers experience severe difficulty in pregnancy. The unregulated hours, with no guarantee of adequate rest breaks, are particularly hard for pregnant women; yet, if hours were properly regulated, many would be able to carry out their work successfully. Labour legislation has recognized the need for rest and meal breaks to maintain the health of other workers for many years. It is almost inconceivable that this has not applied to farm workers as well."[13]

The wide endorsement given to the consistent use of work breaks, their almost universal observance in other industries - even where the work is much less exhausting - and their clear relevance to maintaining the health and safety of people doing farm work causes the Task Force to recommend as follows :

48. that at the time of hiring, conditions of employment be fully discussed between employer and employee, with particular attention being given to work breaks.

Sanitation

As in any industry, adequacy of sanitation arrangements is an important occupational health and safety consideration. It is of particular concern where large numbers of workers are employed in fields or other farm areas and where pesticides or other chemicals are used.

The sanitation matters that are the sources of greatest concern have to do with the availability of drinking water, washing facilities and toilets in the fields. Both individual worker and advocacy group briefs expressed concern about the absence or inadequacy of such facilities on some farms where hired workers are employed. For farmers, family members and permanent hired workers, adequate and reasonably convenient arrangements are normally available in the farm home or adjacent out-buildings or, if they are not, large numbers of people are not present while personal matters are attended to. For some hired workers employed in fields, these facilities are not accessible and, even if they are, travelling to and from them may cut into earnings if pay is based on piece-work rates. Provision of reasonably convenient sanitation facilities is a basic need recognized in all workplaces and is especially important where food is being produced or handled. The Task Force recommends:

> 49. that it be mandatory that Ontario farmers ensure that adequate wash-up and toilet facilities are available with reasonable convenience to all workers on their properties and that the Agency and the local Medical Officer of Health ensure that this recommendation is observed.

Where pesticides are used worker sanitation is especially important and a matter of some anxiety in the farm work force. Common sense dictates that workers who handle pesticides take meticulous care to wash themselves and their work clothes after every use of a toxic chemical. Since the numbers of people involved are not large, this requirement should present few if any, problems. For field workers who are exposed to pesticide residues, the matter, because of their numbers, may be more difficult to deal with. They need convenient wash-up facilities, especially at lunch times and the end of the day and, perhaps equally important, should be kept informed on what pesticides are present.

The Task Force received relatively little information on the actual sanitation practices relating to the use of pesticides on Ontario farms and even less on how the need for workers to know about the chemicals used is dealt with. However, because of the toxicity of pesticides and their widespread use it is convinced that sanitation related practices are an important health and safety consideration. The review papers it had prepared that related to this area confirm the position it takes. Consequently it recommends :

50. that the appropriate agencies mount education and awareness programs to ensure that farmers and farm workers are informed about the importance of careful observance of good sanitation practices in all aspects of pesticide use and contact.

Worker Input to Health and Safety

The need for worker input into their own health and safety protection is generally recognized in Ontario and elsewhere in Canada. Such participation may be achieved in a number of different ways, but those most commonly used are joint (worker and employer) health and safety committees or the appointment of worker health and safety representatives. Under Ontario's Occupational Health and Safety Act, joint committees are required where "twenty or more workers are regularly employed"[14] and designated representatives may act for smaller groups of workers who wish to communicate with their employers on health and safety matters. Such arrangements provide opportunities for employees to discuss their concerns without fear of retaliation and they have been found to generate practical contributions to health and safety protection.

The Ontario Federation of Agriculture recommended to the Task Force that farmers recognize the need for giving workers a voice in health and safety matters. The recommendation reads:

> "Where practical, a mechanism should be developed to involve the farm worker in health and safety concerns in the farm workplace."[15]

The wide endorsement of the Federation's brief by other farm organizations lends the recommendation industry-wide support. What type of mechanism is envisaged is not described but, as already indicated, different ones may be appropriate depending on such factors as numbers of workers covered, the duration of their employment, languages spoken and perhaps other factors.

If the Federation's recommendation is acted on in a positive and imaginative manner, it will be a major step toward meeting a number of hired worker health and safety concerns described to the Task Force. Mainly, the dissatisfaction was expressed about the health hazards associated with the working conditions of seasonal or shorter-term employees on farms producing fruit, vegetables, tobacco and other field crops. The concerns arise where relatively large numbers of workers are engaged to do urgent and physically demanding work. The characteristics of many of the people who do this work have already been mentioned, but it is important to keep in mind that many of them face major personal barriers in coming forward to state their views and concerns. Also, they do need the income they earn in farm employment. This is demonstrated by the distances they travel to find jobs and the fact that they return year after year.

Briefs that spoke about the concerns of seasonal workers noted that a "lack of job security" effectively prohibits them from speaking out about the healthfulness and safety of their work situations. This is not an unrealistic assessment of the situations in which some seasonal workers find themselves. However, the Task Force did not have the resources necessary to independently generate information on the extent and nature of the problem. It notes, however, that there is an element of employer insecurity as well. It is essential to the farmer, especially at planting and harvest times, to maintain a qualified work force, and this cannot be done with high rates of employee turnover.

The specific areas of health and safety discomfort and anxiety mentioned in the briefs relate to a few central issues. Two important ones already discussed are hours of work and sanitation arrangements in fields where numbers of workers of both sexes are employed. Others include provision of drinking water, obtaining information about where it is safe to work because of recent pesticide application, careless handling or application of pesticides close to work stations, sexual harassment and difficulty in securing medical treatment and workers' compensation. The Task Force recognizes that failure to deal with most of these concerns can lead to accidents or illness. The stress they create for the workers involved may be as real and serious for them as the stress associated with economic problems is for farmers themselves.

The Task Force believes that its recommendations will go a considerable way toward alleviating the specific concerns that trouble seasonal workers. However, the basic fear that they will be dismissed if they take action to protect their own health and safety is not yet fully addressed. The evidence before the Task Force leaves no doubt that there is a real need for formal representation arrangements that ensure to farm employees effective means of contributing to the health and safety environment in which they work. There are many different arrangements that might satisfy this requirement. Those provided for in the Occupational Health and Safety Act would probably be satisfactory in most farm workplaces and have the great advantage of the direct participation of the two parties to the employment situation. Another model is suggested by the arrangements made for "off shore" workers from Mexico and the Caribbean area who come to Ontario each year. A government agent hears these workers' concerns and represents them in matters in dispute with the employer. For domestic workers a similar function might be undertaken by the Local Agricultural Manpower Boards. A third approach might be to have area or commodity group mediators to whom both the farmers and farm workers would have easy access and to whom they could take their problems for resolution. Farmers, farm organizations, workers and government should work together to develop appropriate mechanisms. Another consideration is the size of the employee unit that needs formal representation arrangements. In the view of the Task Force it should not be required where there are from one to four hired workers. If from five to ten employees are in a workplace the development of a mechanism might depend on their preference, and where there are eleven or more it would be strongly recommended or mandatory. By issuing guidelines based on these criteria, the Agency could create confidence in the voluntary establishment of representation arrangements. Accordingly, the Task Force recommends:

51. that where practical, a mechanism be developed to involve the farm worker in health and safety in the farm workplace;

52. that the Agency devise suitable worker representation arrangements pertaining to occupational health and safety on farms, ensure that employers inform workers about them and monitor the adoption of them on individual farms.

Stress

The immediately preceding section touches on the issue of stress among hired farm workers. It is almost certainly a more serious problem among farmers themselves. It derives from many sources, but the current economic circumstance of the industry is the major one. Other work related-factors having to do with the complexity of farm machinery and the need for careful control and scheduling of mass production processes are also probable causes of stress.

Evidence of the seriousness of the problem may lie in the number of farm suicides. Between 1979 and 1982 suicides made up 34.8 per cent or 92 of the 273 fatalities occurring on farms as opposed to farm work related fatalities.[16] In addition, it seems likely that stress contributes to accidents in much the same way as fatigue does. It is likely to result in inattention, impatience and carelessness, which are underlying causes of many work accidents.

The Federation of Agriculture recommended to the Task Force that farmers "be made aware of the effects of stress and its role in contributing to accidents" and noted that its "long term effects" should be studied. The Task Force agrees with these suggestions and believes that the Agency should seek expert guidance on the matters identified by the Federation and undertake work that will improve understanding of the problems.

CHAPTER SEVEN

PROGRAM DELIVERY

The Terms of Reference of the Task Force require it to "investigate and report" on "mechanisms for providing protection against occupational health and safety hazards in farm work." Mechanisms have been construed to mean measures or means of promoting occupational health and safety, such as education, legislation, counselling and monitoring. The recommendations already made propose the use of the four mentioned and several others.

Industry spokesmen made it clear that the means of health and safety protection the Task Force chooses to recommend is a matter of concern. A large majority of the briefs mentioned a preferred approach for improving health and safety. There was generally an explicit or implied endorsement of engineering improvements but some scepticism about the Ontario farmer's capacity to exert influence on machinery design. Education is strongly favoured by the various farm organizations as the mechanism that can improve health and safety protection on farms. However, practically all the briefs supporting this view recognize that there may be some situations that require legislative action. This position is illustrated by a statement made by the Ontario Federation of Agriculture.

> "Because of the unique features of agriculture, imposing the Occupational Health and Safety Act or similar legislation would not meet the needs of this industry. Rather we would propose that efforts to IMPROVE health and safety in the agricultural workplace must be directed to effective education programs and engineering improvements. Regulation and its attendant enforcement is possible in limited areas where it can be shown to be feasible and desirable. It is our belief that any attempt to impose blanket regulations upon the industry would prove to be of little benefit."[1]

In addition to the extensive support for legislation on specific matters where it can be effective, thirteen of the seventy-six briefs advocate comprehensive health and safety legislation for farming. They see this being accomplished by bringing the industry under all or most of the provisions of the Occupational Health and Safety Act. With only a couple of exceptions the support for full coverage under this Act came from the briefs of individuals or advocacy groups. In addition, some county and region-based farm organizations see a need for legislation on a number of specific areas ranging from tractor rollover and use of protective equipment to skill training.

Thus, the important choice is between regulatory and educational techniques. As is already clear, the Task Force has made this choice on a specific health and safety problem basis with the result that both means of protection are recommended. In addition, it has proposed greater effort than has been exercised in the past to influence farm-related engineering.

Education

The Task Force has considered almost all voluntary health and safety activities, other than the physical act of correcting a hazard, as being educational. Among them are classroom training and seminars and the dissemination of information through the press, radio, television, meetings, posters, booths at fairs and demonstrations. In addition, education includes consultation and advisory programs, voluntary monitoring and related initiatives. A dimension of this educational approach that was scarcely addressed by the farm community in its communications to the Task Force is that it requires the active involvement of farmers and farm workers in learning, promoting, consulting, monitoring and other such processes. To do this requires an active commitment of time and energy throughout the industry.

Despite the availability of the educational services described in Chapter One, the Task Force concluded that there is a need for greater health and safety protection than is now available to people working on Ontario farms. Therefore, the question was whether to place still greater emphasis on education as the only, or primary, protective measure. The industry had indicated a need for more health and safety education without being specific about the nature and thrusts of the new initiatives. This raises questions of why there is such extensive confidence in the industry that educational programs will meet its occupational health and safety needs and what deficiencies in the programs already in place prevent them from fully meeting these needs.

Argument for Education

The principal point the industry makes in favour of education is that it is an effective means of generating health and safety "awareness". In most of the discussion "awareness" appears to mean having the knowledge required to work safely and maintaining a level of attention or concern that consistently puts this knowledge to use. The widely accepted view is that most accidents happen because of "neglected precautions, hasty manoeuvers and/or careless habits"[2] and that farmers need to be made more aware "of the dangers around them in their workplaces through a hard hitting educational program."[3] Perhaps the idea of awareness is well expressed by the statement "working safely is a state of mind corrected by education or fear. A slight amount of fear is good in the workplace because it creates respect for the machine, animal or chemical, etc."[4]

The emphasis on awareness as the effective means of achieving greater health and safety protection appears to be rooted in the belief that the responsibility "for safety on a farm rests with the individual" because "once the employee, or farm owner or family member begins to work, he is usually on his own."[5] In farming, where there is less reinforcement of safe performance through the information, rules, supervision, penalties and peer pressures likely to be present in other work environments, particularly heavy reliance may have to be placed on education. The Task Force agrees that where there is a high level of individual responsibility for working safely, a strong case can be made for education as a means of ensuring that the responsibility is understood and accepted.

The nature of this responsibility is not the same in every farm work situation. This arises mainly because some farm workers are also employers while some are not and because work may be done alone or in teams or groups. The farmer working alone is truly "on his own" and, because he undertakes both managerial and production tasks, is responsible for all aspects of work safety. However, a hired worker is dependent on the farmer for work direction, training and machine maintenance, which means that the health and safety responsibility is shared. Usually, it is the hired worker who is in a dependent situation and who has to place confidence in the judgement and sound practice of the farmer for major aspects of his work safety. The hired worker's responsibility is to do his tasks safely within the direction and physical arrangements the farmer has provided.

Because of the farmer's long-term commitment to his responsibilities, education seems an appropriate means of developing the awareness he needs. Nevertheless, it should be kept in mind that in an area as complex as individual assumption of responsibility, the results of education are certain to be highly variable. Further, as indicated in Chapter One, the capacity and disposition of farmers to take advantage of educational opportunities may cover a very wide range indeed.

Whether education is an equally practical means of protecting the health and safety of seasonal and casual farm workers is questionable. Many of these people are likely to have limited capacity and opportunity to benefit from health and safety education programs and the quality of the training they get almost certainly varies greatly from farm to farm. In this connection, a significant number of briefs suggest compulsory short term training programs for farm workers and that training be formalized to ensure that it reaches an acceptable standard. The thoughts of the Lanark County Federation of Agriculture on responsibility for health and safety and the role of education in meeting it are relevant.

> "We suggest a type of "contractual worksheet" be designed, one compatible to the different types of farming. This could be done by the Farm Safety Association, perhaps in conjunction with OMAF. This sheet would list the danger areas on the specific type of farm, deal with safety concerns re livestsock, machinery, dust, noise, structures, etc. On hiring a farm employee, this sheet must be discussed, with proper and thorough safety instruction accentuated. Danger areas would thus be identified, safety measures outlined, and this would then be signed by both the employee and the employer. This would serve to remind both parties of their responsibilities regarding safety measures, and could serve as a protection for the employer, in the event of an accident and of being sued for negligence or carelessness.
>
> "Farming has many occupational hazards, and the proper use of proper safety equipment cannot be stressed often enough. Safety courses should be mandatory across the province for farm workers, farmers, owner-operators, wives."[6]

The Task Force recognizes the importance of education in promoting work health and safety and that it may have an especially important place among workers who are also owners and managers. Nevertheless, for reasons discussed, it believes the case for total reliance on education is less than conclusive. Too heavy reliance on any one means of delivering health and safety programs is inconsistent with the views and practices of those who have had extended experience in the area. For example, the Farm Safety Association has found that "education alone is not enough." To the extent that awareness will meet the need for health and safety protection, education is the most important mechanism of delivery. However, awareness of what should be done and what is done are not always the same thing. This report has repeatedly noted the difference and where that difference affects a shared responsibility stronger measures than education may be needed.

Present Deficiencies

As to why the educational programs already in place do not fully meet the need for health and safety protection on farms, the Task Force did not study the question in detail. It did, however, receive information on the matter from the agencies offering educational services and from the farming industry. This forms the basis of the views set out below.

First, it is important to note that the programs are not designed to effectively resolve all farm health and safety problems. They are, for the most part, low-key and lack authority to require compliance with safe practices. For example, they may promote the use of ROPS on farm tractors, but, as the evidence already presented from Sweden and the Federal Republic of Germany makes clear, the way to reduce rollover fatalities is to require ROPS by legislation. Educational approaches cannot be expected to produce better performance when they cannot arouse levels of response that result in protective action. However, within the range of influences that can be exerted by voluntary educational programs there may be considerable room for improvement. The Task Force sees this being possible with respect to coverage, farmer participation and the urgency of the delivery method used.

Program Coverage and Resources

The programs in question are the training, information, monitoring, labelling and basic how-to-do-it guidelines mentioned in Chapter One. They are mounted mainly by the Farm Safety Association, Ministries and suppliers, of which the Association is the only agency primarly devoted to advancing farm work health and safety.

The incomplete coverage of the Association's program stems from the fact that the mandate of the Workers' Compensation Board extends on a compulsory basis only to paid employees. Also, about 3,500 self-employed farmers have voluntarily taken coverage for themselves. Consequently, the income derived from payments to the Board is inadequate to provide effective educational services to the whole farming industry. Nevertheless, the Association attempts to make its services available to farmers who do not participate in the Workers' Compensation program and, with respect to requests for assistance in emergency situations, it does not differentiate between them and farmers who are paying Workers' Compensation premiums. This arrangement inevitably has a negative effect on the scope and quality of the services offered and is a matter of irritation among farmers who financially support the Association.

Some indication of the extent of the shortfall in resources is indicated by the following tabulation compiled from May 1985 data obtained from the Safety Education Authority of the Workers' Compensation Board.

Association*	1985 Funding $	Estimated Worker Coverage	Funding per Worker $
IAPA	14,364,300	1,300,000	11.05
CSAO	7,963,600	135,000	59.06
MAPAO	2,069,500	34,000	60.87
FPAPA	1,311,200	20,000	65.56
TSA	1,087,200	82,000	13.26
EUSA	1,471,100	12,500	117.69
PPMSA	644,900	30,000	21.50
FSA	837,900	100,000	8.38
HOHSS	1,719,500	205,000	8.38

Since farming seems most appropriately compared to construction, mining and forestry, its $8.38 funding per worker compares respectively to $59,05, $60.87 and $65.56 for these three industries. In addition, the 100,000 figure for farm workers is well below the 135,600 figure calculated from the Labour Force and used in Chapter One but both are much larger than the number for which compensation premiums are paid.

The other major indicator of incomplete coverage is in the Association's staff. It has only seven field officers to carry out its programs across the province. These people are involved in teaching, auditing, consulting, information service, public relations, organizing and running meetings, seminars and demonstrations, speaking engagements and, perhaps, other activities. The evidence available to the Task Force shows that their workloads are too heavy to permit all their responsibilities to be covered effectively.

Exploration of the funding deficiency problem with the Workers' Compensation Board indicates that there is no practical way of increasing the amount available from it short of achieving a great expansion of voluntary coverage. This is not easy to accomplish. However, the funding supplied by the Board is the foundation on which the education program to promote health and safety in the farming industry rests.

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* IAPA - Industrial Accident Prevention Association; CSAO - Construction Safety Association of Ontario; MAPAO - Mines Accident Prevention Association of Ontario; FPAPA - Forest Products Accident Prevention Association; TSA - Transportation Safety Association; EUSA - Electrical Utilities Safety Association; PPMSA - Pulp and Paper Makers Safety Association; FSA - Farm Safety Association; HOHSS - Hospital Occupational Health and Safety Services.

A solution suggested by the Ontario Federation of Agriculture and others is that there be public funds matching those obtained from the Board put into the farm health and safety protection program and that these be channelled to it through the Ministry of Agriculture and Food. This proposal would increase the financial resources available for educational purposes in a major way and would also introduce new concepts into the sponsorship of health and safety education for workers. The funding arrangement and the associated responsibilities would have to be worked out with the Safety Education Authority.

The Task Force is convinced that funding has to be made available to promote health and safety program coverage of farmers who are not compensation program participants and that a satisfactory formula for doing this is needed. The important considerations are that coverage of the health and safety education program be made equally effective across the whole farming community and that the resources not be so extended as to diminish the quality of their inputs. The data presently available do not permit a determination of where the greatest educational needs are, but it seems highly probable that those farmers who operate almost entirely on their own, comprise one of the groups most urgently requiring attention.

Issues of program coverage were also brought to the attention of the Task Force in connection with Ministry of the Environment and supplier educational activities. On the other hand, the nature of the Ministry of Agriculture and Food initiatives in the area tends not to raise coverage questions since they are mainly in the form of publications or radio or television broadcasts and are readily available. However, the Ministry of Agriculture and Food has a major network of county-based offices and staff through which it might involve farmers in health and safety education and promotion. The field staff already assist the Association's consultants with their work but they do not have a "front line" role in health and safety protection programs.

The staff of the Intergovernmental Relations and Hazardous Contaminants and Coordination Branch of the Ministry of the Environment are too few in number to monitor the use of farm chemicals. Their responsibilities are too wide to permit them to undertake such work and, in practice, their one-to-one contact with farmers is likely to be limited to emergency situations. Considering the potential for wide variations in farmer understanding of the characteristics of pesticides and practices relating to their use, the absence of readily available auditing and advisory services in the Branch's program is considered a serious deficiency. To overcome the problem, the Task Force suggests exploration of the possibility of the Ministry of Agriculture and Food assuming responsibilities in this area. It believes that the Agriculture Laboratory Services unit of that Ministry is well equipped to provide the monitoring and advisory services needed.

As for dealer-based education having to do with equipment, crop protection materials and fertilizers, user coverage is potentially complete at the point of purchase but is likely to vary in quality and detail depending on buyer interest and the sales person's knowledge, communication skills and pressure of work. Similarly, where suppliers offer training either directly or through associations, the coverage of farm groups may vary with the advertising done, user interest, the weather and distance to the training site. As for the resources that supplier industries and dealerships devote to farmer education, the Task Force is aware that the salespeople are drawn from among college graduates and others who are technically qualified and that, in the chemicals area, the Canadian Agricultural Chemical Association is working to ensure that all dealers are certified. Despite this, one of the most frequent requests made to the Task Force in its public hearings was to ensure that salespeople in farm supply outlets, especially those handling chemicals, be more fully trained in the characteristics and use of the products they sell. Almost certainly, this demand reflects the increasing technical complexity of farming and the difficulty some farmers and workers have in keeping abreast of new products and practices.

Participation

For occupational health and safety education to be effective, farmers and farm workers must be involved in the educational process. By concentrating on this aspect of their programs, both Alberta and British Columbia appear to have had considerable success in raising farm health and safety awareness. While the approaches used in these provinces are not easily transferred to Ontario, the fact that meaningful efforts have been made is important to a jurisdiction that also sees education as the major form of health and safety program delivery in farming.

The Task Force has considered several suggestions that it believes will promote farmer participation in health and safety education activities. It recognizes that securing active participation in health and safety efforts is a challenge in itself and that the record of farmer and worker involvement has not been encouraging in Ontario. If it has advice to offer, it is to integrate the subject matter with other topics to which the risk of injury or illness is related.

The organization of farming in Ontario may provide a key to securing more general participation in health and safety initiatives. There clearly is a view among fruit and vegetable growers, grape growers, dairymen, pork producers, nurseries and, perhaps, in other areas of commodity specialization, that health and safety needs to become a central concern at the producer level. The suggestion is that the commodity associations and marketing boards be responsible for the programs insofar as they are peculiar to commodity concerns. This might lead to greater farmer participation and consideration of production and health and safety risks as one subject, not separate ones. If the commodity groups can be encouraged to take the lead in promoting health and safety as an integral part of production decisions, a major step will be taken towards greater farmer involvement and integration of health and safety as an element of every farm work, staffing, equipment and production decision.

The proposal is not to remove all responsibility from central agencies such as the Farm Safety Association, and Agency, but to reinforce their contribution with "work-face" perceptions. The commodity groups would not need to duplicate the expertise of the central agencies but would rely on them for services and program elements common to all types of farming. The great advantage would be a broadening of the base of health and safety discussion and understanding. However, the approach would have little impact on performance if it is undertaken without strong and committed leadership at the commodity group level.

A second means of securing farmer and worker participation may be the use of voluntary auditing or monitoring programs. This is a means of educating farmers and workers about the health and safety hazards of their own operations and has been used with considerable success in other jurisdictions. It can range from school children auditing their parents' properties to a community or commodity group-organized inspection. In Ontario it is in place for a few large farms that participate in an annual voluntary, or on request, audit program carried out by the field consultants of the Farm Safety Association. The Task Force would like to see this approach extended throughout the industry through the use of farm family, community and commodity group audits as well as an expanded program by the Association. There is no question that audits draw attention to hazards, increase awareness of them and, in many instances, result in corrective action being taken. The Task Force tested response to the use of audits with some people who appeared before it during its hearings and found a better than fifty per cent in favour of the idea.

Face-to-face consultation is urged as an effective means of promoting better health and safety performance at work. This approach is also used, to a limited extent, by the Farm Safety Association consultants, but it is clearly an expensive and time consuming measure, which limits its scope. It may, however, be highly effective and, if it could be organized on a voluntary basis within commodity groups or designated areas, it could be developed to reach substantial numbers of farms. This raises the issue of the industry or segments of it organizing to insure better work health and safety performance by means of a self-help approach that could also be cost effective. To do this successfully a greater consciousness of health and safety will have to be developed in the industry; in other words, the matter needs a higher profile.

As a fourth means of securing wider participation in health and safety education, the Task Force suggests a return to a larger role for the

Ministry of Agriculture and Food in this area. The confidence of the farm community in the Ministry's capacity to understand and promote its interests impressed the Task Force. It has the capability of getting farmers to listen and act. It has already been noted that the Ministry has a field organization well equipped to procure farmer attention, and the resource should be used to further health and safety awareness. The suggestion means that the Ministry would have a delivery as well as a policy role in occupational health and safety.

Thrust

The Task Force is convinced that a passive educational program cannot move occupational health and safety in Ontario agriculture beyond the level of attention it presently receives. It will require the exertion and commitment of many more people than the field officers of the Farm Safety Association. The task will require a dynamic approach and dynamic and committed leadership that is capable of involving all segments of the farm community in an ongoing, high-profile effort to generate and maintain the awareness that so many agree is essential.

A number of briefs to the Task Force recognized the major changes new technology has brought to health and safety on farms, and a few made a connection between that situation and the need for education. However, the approach to farm safety and health education may not have kept pace with the need for it. The demands of technically advanced machines, crops, animal generation and care processes, and other developments may not be met by casual training through farm papers, procedural guidelines and salesmen's warnings. The need may be for more formal and, in some instances, mandatory training.

In this connection, the Task Force is concerned about the careful use of pesticides and problems that have recently demonstrated the need for that care. It has considered what might be done to ensure that Ontario agriculture remains free of serious incidents of pesticide contamination. Despite a fairly high level of awareness of potential hazards, it has considered proposing mandatory user certification or, at least, mandatory training of pesticide users. This training would be geared to reflect in its content and intensity the present Ontario classification of pesticides with respect to availability, packaging and other factors. Because it is not recommending such mandatory measures in this report, the Task Force urges the concerned commodity associations and others that are interested to consider what controls may be warranted in the next few years, not only to protect workers but also to protect consumers and the good name of the industry.

The Task Force is convinced that the farming industry will advance its health and safety performance through education only if it enters into careful consideration of matters such as those introduced in the two preceding paragraphs. The directors of farm education agencies must take the lead in identifying areas or aspects of farming in which education is needed and keep these before the farming community and a broader public in a highly visible way. To be effective, the health and safety education program requires leadership that has a sense of urgency; this can only come from people with knowledge of, and sensitivity to, health and safety concerns.

Legislation and Regulation

As already noted, limited use has been made in Ontario of legislation and regulations as a means of protecting the health and safety of people engaged in farm work. Some mandatory requirements are set out in the Highway Traffic Act and the Pesticides Act, but the subject area lacks the focus of attention provided by a comprehensive health and safety law and the associated coordination of administrative responsibility. In these respects the situation is comparable to that in other provinces but it contrasts sharply with those in north-west Europe and the United States.

As revealed to the Task Force there are various shades of opinion within the Ontario industry about the extent to which health and safety protection should be based on legislation. The two most widely held views are that legislation should be restricted to problem areas where it can be shown clearly to be effective in improving health and safety performance and that comprehensive legislative protection should be available, particularly to paid employees. Some of the gradation between these positions is reflected in briefs that advocated legislation giving particular types of protection, as follows:

- that the use of protective clothing (hard hats, safety boots, etc.), guards on machinery, and secure storage of chemicals be made mandatory;
- that training in the operation and maintenance of farm machinery be mandatory;
- that the machinery-related standards of the American Society of Agricultural Engineers or other competent authority should be given the force of law in Ontario;
- that safety courses be mandatory "across the province" for all categories of farm workers;
- that all farm labour be required to take a one day course on farm safety, and that regular up-dating be required; and,
- that specific agricultural health and safety legislation be applied to farms that are large employers, but not to family farms.

The view that only limited use should be made of legislation is put forward in the briefs of the Ontario Federation of Agriculture, a substantial number of commodity associations and marketing boards and many regional and county farm organizations. The reasons underlying this limited use position are not always made clear. They include: that existing legislation on occupational health and safety is unsuitable for agricultural establishments, that the enforcement of comprehensive legislation would be a difficult to impossible task, that it would be costly and inconvenient, that the Ministry of Labour's administration of it would be insensitive to farm circumstances, and that it is unnecessary. For the most part, these positions were stated to the Task Force without elaboration. However, the Downham Nursery brief described a voluntary effort to apply the provisions of the Occupational Health and Safety Act to a farming enterprise and reported few problems in doing so. The principal condition suggested was that the application be phased in over several years giving time to modify structures and equipment which might not meet the standards set in existing regulations. Also, the brief suggested the use of advisors, inspectors who are familiar with farming and questioned the need for a refusal to work provision.[7] In summary, the main thrust of the limited legislation position is captured in statements from the briefs of the Ontario Institute of Agrologists that "effective legislation must be realistic, acceptable and enforceable" and the Frontenac, Leeds and Grenville Local Agricultural Manpower Board "that certain legislation is required but that it should be introduced gradually to be most effective. The sudden impact of heavy legislation would have a derogatory effect."

The opposite position that comprehensive health and safety protection should be provided is less widely held than the one discussed above. It was advocated mainly by individual farm workers and advocacy groups, and also by a number of people representing owner/operators and, in varying degrees, by county or regional based farm organizations. The principal considerations on which this position is based are that unnecessarily hazardous machinery and practices have been tolerated in farming, and movement toward correcting them is unacceptably slow; that legislation has been demonstrated to be the effective and accepted means of delivering workplace health and safety protection for employees; and that legislation can provide consistent health and safety practices across an industry better than voluntary educational programs.

The Task Force endorses selective use of legislation for delivering health and safety protection to people working on farms. While it does not propose that a large number of problems be addressed by legislation, it is recommended in areas critical to improving farm work related health and safety. Its hope is that laws in these areas will relieve major concerns and, at the same time, provide a focus around which the industry, including the farmers' federations and associations, the Ministries of Agriculture and Food and Labour, individual farmers and farm workers, the farm supply industry, training establishments and others, will develop levels of protection that render further legislation obviously unnecessary.

Details on the areas recommended for legislation are given in Chapters Three through Six. The areas were selected on the basis of the seriousness of the hazards to be corrected and the likelihood of corrective action occurring if reliance is placed on less authorative measures. With respect to seriousness, this has been judged mainly on the basis of experience and community concern. For example, tractor accidents account for more than half of farm fatalities, and 60 per cent of these result from rollovers. These facts, along with clear evidence of the effectiveness of ROPS in preventing fatalities, are sufficient to warrant mandatory rollover protection, and the use of ROPS is also supported in the industry. Despite this, there remains extensive use of tractors without ROPS in Ontario farming. Therefore, because of the delays in general acceptance of ROPS on a voluntary basis, the Task Force believes it is esssential to make such protection a legal requirement on farm tractors. Similar reasoning underlies the legislative proposals pertaining to shielding of machinery, fencing of manure pits, re-entry into fields sprayed with pesticides, and other situations where regulation is suggested.

A number of considerations enter into the criterion of likelihood of corrective measures being taken. Some health and safety hazards have been recognized for many years and are well understood, but they remain problem areas. The failure to use protective clothing and equipment when handling chemicals or products that generate dusts are cases in point. The extent to which this occurs makes it clear that the requirement needs reinforcement of the strongest possible type. Regulation and inspection will provide an added incentive for farmers and workers to take greater care to avoid exposure to crop protection material and dust hazards on which there is extensive evidence that they now fail to observe practices of reasonable caution.

In addition to the two major criteria of seriousness of the hazard and persistent lack of attention to ones that are well understood, several other factors have entered into the Task Force's decisions to recommend legislation as a protective measure. The fact that comparable measures are in place in farming in other jurisdictions or in other industries in Ontario has not been overlooked. That is, regulation has been shown to provide practical protection, even in farming. Second, evidence of some need for public protection has been considered. The requirements for warning beepers on self-powered farm machines and fences on manure storage areas have elements of this concern. The age of victims (very young and very old) is a consideration in assessing the importance of this criterion. Third, the Charter of Rights and Freedoms requires that legislation not discriminate between categories of workers. The exclusion of hired farm workers from the protection of the Occupational Health and Safety Act is clearly inconsistent with this basic right unless alternative and, approximately, the same, protection is provided by other means. All of these factors, along with the level of public and farm community concern about the issue in question, have had a bearing on the decisions that selected hazards for legislation and regulation.

The Task Force believes the above discussion of its own and the farming industry's views on the use of legislation will facilitate the introduction of such health and safety protection for people who do farm work in Ontario. However, this legislation should be carefully drafted and be in a form that is readily accessed and understood by all the people who work on farms.

The special concerns of hired workers include the health and safety aspects of long hours, sanitation arrangements, information on the work environment, needs relating to pregnancy and stress associated with insecurity. The Task Force believes that steps to meet these concerns need not resort to the bringing of farming under the Occupational Health and Safety Act. Limited legislative support, combined with giving hired workers practical representation in the workplace and on the boards of directors and programs of agencies that promote occupational health and safety on farms, will have more positive effects than the application of the Act to all establishments in the industry. In reaching this conclusion, the Task Force notes that the major concerns are related mainly to those types of farming in which large numbers of temporary or seasonal workers are employed (especially where they are employed in fields). It received only very limited information on the existence of health and safety concerns peculiar to permanently employed hired workers. Further, its conclusion is based, as in the discussion of education, on the view that the commodity associations and leading farmers in those segments of the industry employing temporary and seasonal hired workers will accept the responsibility and give strong leadership in promoting healthful and safe work situations.

Grants

The apprehension among farmers about legislated or other formal occupational health and safety programs in their industry arises, in large part, from fear of increased costs. Briefs to the Task Force drew attention to the fact that such programs require substantial funding. Several made a case for financial assistance to encourage farmers to comply with health and safety recommendations or guidelines. Operators of relatively small farms appear to be especially anxious that measures that would significantly increase their costs not be made applicable to small and medium-sized general farms. The economic situation in the industry, reviewed in Chapter One, indicates why this concern is so intense.

Proposals for funding assistance to individual farms varied from outright grants to reductions in Workers' Compensaion rates in recognition of a good accident record. Most of the proposals made would tie financial assistance to specific purposes, the purchase of appropriate respiratory equipment for farmers working around grain dust and pesticides, for example, or the cost of installing rollover protection on tractors. Similar suggestions were made as a means of promoting farmer participation in training programs, and the possibility of the Canada Employment and Immigration Commission and the Ministry of Agriculture and Food jointly funding formalized safety training was proposed by both the Manpower Board and Farm Labour Pool in the Quinte area.

The Task Force believes that financial assistance would facilitate acceptance of formal health and safety programs in Ontario agriculture. The low earnings of some farmers may make it extremely difficult for them to comply with a regulation or guideline that requires a safety fence around a manure pit or a significant expenditure on some other installation or piece of equipment. It is also aware of the difficulties of administering grants fairly and without abuses and that payments to employers to promote health and safety in their own operations is not accepted practice in Ontario. Nevertheless, the Task Force suggests that carefully designed and specifically targetted grant programs be used initially as a component of an upgraded occupational health and safety program in farming. As already mentioned, such a measure is in place with respect to the new construction of liquid manure storage facilities. Similar arrangements are recommended, in conjunction with several of the mandatory requirements suggested.

With respect to the use of merit rating for farms under the Workers' Compensation Program, the Task Force made a preliminary investigation of this proposal. There is already an incentive arrangement built into the Workers' Compensation rate structure that encourages farmers to maintain low accident rates. The advice received was that to carry the incentive beyond what is available would be complex and probably not very effective, largely because of the small employee size of farms. However, it may be that the agency responsible for health and safety in agriculture could undertake further discussion with the Workers' Compensation Board to explore in detail the possibilities of the long-run development of such a system.

Child Care

Reference has been made in this report to the radical changes in farm work that have occurred in recent years. This has not bypassed the role of women in farming enterprises. Today, farm women work in all aspects of agriculture and in a wide variety of unrelated careers. New levels of education and job opportunities, both on and off the farm, have greatly changed the work patterns of rural women.

In the report "Women in Rural Life - the Changing Scene"[8] child care is listed as one of the issues most important to rural women. Seventy-six per cent of the submissions received during that study addressed the child care issue. The report notes that the fact that a large number of women are in the work force has affected family life and has made child care a critical issue in rural areas. The problem is often compounded by isolation and a lack of public transportation. Similar concerns to those discussed in the study were brought to the Task Force.

Briefs expressed concern about farm children who are unattended while parents are engaged in farm work. That presented by the Carleton Farm Safety Council describes a general concern.

> "Child care facilities must be initiated in rural areas, to ensure that children of farm people are properly cared for, while the parents are out of the home attending the farm duties. Often young children, are left unattended, or these children are left in the care of an older sibling, who is not mature enough to handle the responsibility. Parents will have to encourage the use of child care facilities after they are established, because it has been an accepted practice for generations to leave children or take them out to the workplace, where they are often unobserved, and prone to accident."

Also, briefs presented by the Farm Labour Information Committee and the London Status of Women Action Group expressed concern about the well-being of children of farm workers. Young children are frequently found in the workplace because no child care is available to them. Older children often work in the fields side by side with adults under difficult working conditions and receive limited or interrupted schooling because of the family's need for income and itinerant employment.

Throughout this Task Force report, recommendations are made that have particular application to the safety of children as it relates to hazards that are associated, for example, with tractors, farm supplies and manure disposal systems. At the hearings various suggestions relating to child care were made, such as day care centres and the Federated Women's Institute Ontario Child Care Project. They indicate a wide range of views on the need for further study and how to correct the problem.

The Task Force recognizes that the problem of child care on farms is complex and it is not prepared to make specific recommendations for a solution. The study sponsored by the Ministry of Agriculture and Food had an opportunity to consider the various facets of the problem that must be considered in developing workable programs. The Task Force has noted and supports a recommendation contained in the report "Women in Rural Life" that an assessment of child care on farms be conducted and that the barriers to suitable programs be addressed. From the limited discussion of the topic in the Task Force hearings, it believes the matter deserves urgent attention.

Conclusion

Because of the information base from which it worked, the Task Force has addressed some topics in this report in less detail than they warrant. As a consequence, some of the recommendations are specific and call for the immediate correction of what appear to be the more serious health and safety hazards in farming. Other recommendations and suggestions contained in the text merely propose more exploration of a potential problem or one that is reasonably well defined but which the Task Force did not have the resources to study. Among these, which are most likely to lie in the areas of health and of lost time injuries among farm owners, problems may emerge that require attention as urgently as any of those on which the Task Force has proposed legislation. This situation underlines the necessity for action on the information-related recommendations.

The discussion throughout the report, but mainly in this final chapter, reflects the Task Force view that its proposals are a step forward toward an objective, not necessarily a program that will accomplish it. In particular, the fact that there has been a health and safety program in place in Ontario farming for more than a decade and that some of the obviously urgent problems are still being discussed and not acted upon is disconcerting. Despite this, the Task Force has, to some extent, acquiesced to the industry's view of how to improve performance. At the same time it has told the industry that its performance must improve and has, directed this responsibility to every Ontario farmer. If the mix of education and legislation delivery mechanisms is not shown by hard data to have produced results within five years, the Task Force recommends that a set of more stringent health and safety performance requirements be implemented.

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12. Brief. Reed.

13. Brief. London Status of Woman Action Group.

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Chapter Seven

1. Brief. Ontario Federation of Agriculture. p.7.

2. Brief. Northumberland and Durham LAMB.

3. Brief. Northumberland County Federation of Agriculture.

4. Brief. Parker.

5. Brief. Ontario Federation of Agriculture, p.11.

6. Brief. Lanark County Federation of Agriculture.

7. Brief. Downham Nursery Incorporated.

8. Molly McGee, Women in Rural Life - The Changing Scene. Ministry of Agriculture and Food, Toronto, 1984.

APPENDICES
TO REPORT
OF
ONTARIO TASK FORCE
ON HEALTH AND SAFETY
IN AGRICULTURE

APPENDIX 1

WRITTEN BRIEFS

presented to the

ONTARIO TASK FORCE ON HEALTH AND SAFETY

IN AGRICULTURE

WRITTEN BRIEFS

ADVOCACY GROUPS

London and District Labour Council
London Occupational Safety and Health Group
London Status of Women Action Group
Ontario Farm Labour Information Committee
Ontario Farm Labour Information Committee - London
Unemployed Action Alliance (U.A.A.)

COMMODITY ASSOCIATIONS AND MARKETING BOARDS

Flowers Canada
Holstein Association of Canada - Ontario Branch
Ontario Asparagus Growers' Marketing Board
Ontario Fruit and Vegetable Growers' Association
Ontario Grape Growers' Marketing Board, Ontario;
    Tender Fruit Producers' Marketing Board and Ontario
    Fresh Grape Growers' Marketing Board.
Ontario Milk Marketing Board
Ontario Pork Producers' Marketing Board
Victoria County Milk Committee

COMPANIES

Aidie Creek Gardens Inc.
Downham Nursery Inc.
Maple Leaf Mills Limited - Agriculture Division

COUNTY FARM SAFETY ASSOCIATIONS

Carleton Farm Safety Council
Dundas Farm Safety Association
Kent Farm Safety Association
Lambton Farm Safety Association
Middlesex Farm and Home Safety Council
Ontario County Farm Safety Association
Peterborough County Farm Safety Association
Simcoe Farm Safety Association
Thunder Bay Farm Safety Association

FEDERATIONS AND BRANCHES

Arnprior Region Ontario Federation of Agriculture
Christian Farmers Federation of Ontario
Lanark County Federation of Agriculture
Northumberland County Federation of Agriculture
Ontario Federation of Agriculture
Stormont County Federation of Agriculture
Temiskaming Federation of Agriculture
York County Federation of Agriculture

GOVERNMENT AGENCIES

Agriculture Canada
Canadian Centre for Occupational Health and Safety
Ontario Ministry of Health

MANPOWER AGENCIES

Labour Pools

Canada Farm Labour Pool - Frontenac, Leeds, Grenville
Ottawa Valley Canada Farm Labour Pool - Carleton
Lanark, Renfrew
Stormont and Dundas Farm Labour Pool

Manpower Boards

Eastern Counties Local Agricultural Manpower Board
Kent and Area Local Agricultural Manpower Board
Northumberland and Durham Local Agricultural Manpower Board
Quinte Local Agricultural Manpower Board

PERSONAL BRIEFS

Abraham, Ernst
Alexander, R. Norman
Allen, Scott
Bowman, Graydon & Laurel
Brooks, Alvin
Browne, Angela
Cassidy, Peter
Foster, Greg A.
Haeck, Christel
Hill, Bruce
Keith, David
Lees, Dr. R.E.M.
Macrae, Robert
Massey, Sheila
McCormick, Ian
Morgan, Patricia
Parker, Seldon
Peabody, Christopher
Reed, John
Smith, Bonny
Terry, Bernard
Whetter, Catherine
Wilson, John Jeffery

PROFESSIONAL ORGANIZATIONS

Ontario Institute of Agrologists

SUPPLIER ORGANIZATIONS

Canadian Agricultural Chemicals Association
Fertilizer Institute of Ontario Inc.
St. John Ambulance

WOMEN'S INSTITUTE

Bruce-Grey County Women's Institute
Cochrane/Temiskaming Federated Women's Institute of Ontario
Guelph Area Women's Institute - Farm Safety Committee
Simcoe Area Women's Institute
Southwestern Area Women's Institute

APPENDIX 2

QUANTITATIVE ASSESSMENT OF FATALITIES AND LOST TIME INJURIES IN AGRICULTURE

prepared for the

ONTARIO TASK FORCE ON HEALTH AND SAFETY
IN AGRICULTURE

by

Mittermaier & Associates

Toronto

March 1985

MITTERMAIER & ASSOCIATES
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I. INTRODUCTION

The purpose of this appendix is to present quantitative information on fatalities and lost time injuries in Ontario agriculture, and to compare it to that of other industries.

Two industries were selected on the basis of similarity of work and availability of fatality and injury statistics and employment data. These industries are mining and construction. Both, in common with agriculture, involve hard and varied physical work and the use of mobile machinery. For other comparable industries, such as forestry, not all necessary data were readily available.

The comparisons were made in terms of fatality and injury rates, measured as fatalities or injuries per 100 employment per year.

The material in this appendix is presented in the following order:

- Employment data
- Fatalities
  - data sources
  - data adjustments
  - comparisons of fatality rates
- Sources of fatalities in agriculture
- Lost time injuries
  - data source
  - comparisons of lost time injury rates

II. EMPLOYMENT

In order to calculate fatality and injury rates, employment figures for agriculture, mining and construction were obtained from the Labour Force Survey of Statistics Canada.

These employment data are based on monthly interviews carried out in about 52,800 households across Canada, involving approximately 112,000 respondents. The data measures the employment status during the week containing the 15th day of each month. The average of the twelve monthly figures gives an estimate of the equivalent annual employment which also takes into account any seasonal variation.

The accuracy of the estimates varies according to the size of employment in an industry. For example the annual estimates for agriculture have a standard deviation of 5% to 10%. For mining this is in excess of 10% to 17% and for construction it is 3% to 5%. A standard deviation is a statistical measure of variation. In approximately 68% of cases the sample average can be expected to lie within one standard deviation of the true average, and in 95% of cases it can be expected to lie within two standard deviations. The impact of this sampling error on the analyses will be briefly referred to in Section III.3.

For agriculture, figures were obtained for the years 1966 to 1984, in order to provide a picture of past trends in the employment. For the other two industries, employment figures were obtained for 1981 to 1984 only, the four years for which the rates were compared.

Exhibit 1 presents a table of the employment figures and Exhibit 2 shows these plotted for agriculture. These plots show that the total employment in agriculture is now again more or less at the level at which it was in the late 60's, after being noticeably lower during the mid 70's. On the other hand the composition has changed. Farmers, ie employers and those on own account, have decreased, and correspondingly with them the unpaid workers, while paid workers have approximately doubled.

III. FATALITIES

Before comparing the fatality rates of the three industries, the fatality data from the sources used will be briefly described. Following this, adjustments to the data will be discussed. These adjustments were necessary in order to make the data consistent with each other.

III.1 Data Sources

Fatalities in mining and construction must, according to the Occupational Health and Safety Act, be reported to the Ministry of Labour. This is not the case for fatalities in agriculture, because agriculture is not covered by the Act. In other words, the available sources for fatality data are not the same for the three industries, and thus the definitions of what constitutes a fatality which is to be included in the count, also differ.

The sources used in this analysis were:

- Agriculture : Farm Safety Association
- Mining : Mining Health and Safety Branch, Ontario Ministry of Labour
- Construction: Construction Health and Safety Branch, Ontario Ministry of Labour

For the past number of years, the Farm Safety Association (FSA) has been compiling farm fatality reports based on information drawn from a number of different sources, including the police, the Coroner's Office, The Wokers' Compensation Board (WCB) and its field staff.

The FSA includes in its reports any fatality that occurs on a farm or which involves a farmer. It thus also includes fatalities that, although occurring on a farm, are:

- of people from a city, say, not doing farm work, such as cutting down a tree for firewood,

EXHIBIT 1

EMPLOYMENT IN AGRICULTURE, MINING AND CONSTRUCTION

(In thousands)

	Agriculture (1)				Mining (2)		Construction	
Year	Total	Paid Workers	Farmers (4)	Unpaid Workers	Total	Paid Workers	Total (3)	Paid Workers (2)
1966	137	32	79	27				
1967	143	31	82	29				
1968	138	32	75	30				
1969	131	33	73	26				
1970	127	34	69	24				
1971	129	35	69	25				
1972	111	32	60	19				
1973	116	32	65	19				
1974	114	30	61	22				
1975	117	45	55	18				
1976	112	44	51	17				
1977	127	49	57	20				
1978	131	43	64	24				
1979	146	50	69	27				
1980	143	58	63	22				
1981	143	56	65	22	50	50	216	180
1982	131	51	62	18	36	36	206	171
1983	136	57	60	18	34	33	203	168
1984	125	48	59	18	35	35	219	181

1. Source: Statistics Canada, Catalogue 71-529, Catalogue 71-001 (Dec. 1984), and Background Paper Number 1, Ontario Task Force on Health and Safety in Agriculture.
2. Source: K. Bennett, Statistics Canada, unpublished data:
3. Source: Statistics Canada, Catalogue 71-529, Catalogue 71-001 (Dec. 1984).
4. "Farmers" consists of Statistics Canada descriptions of "own account" and "employers".

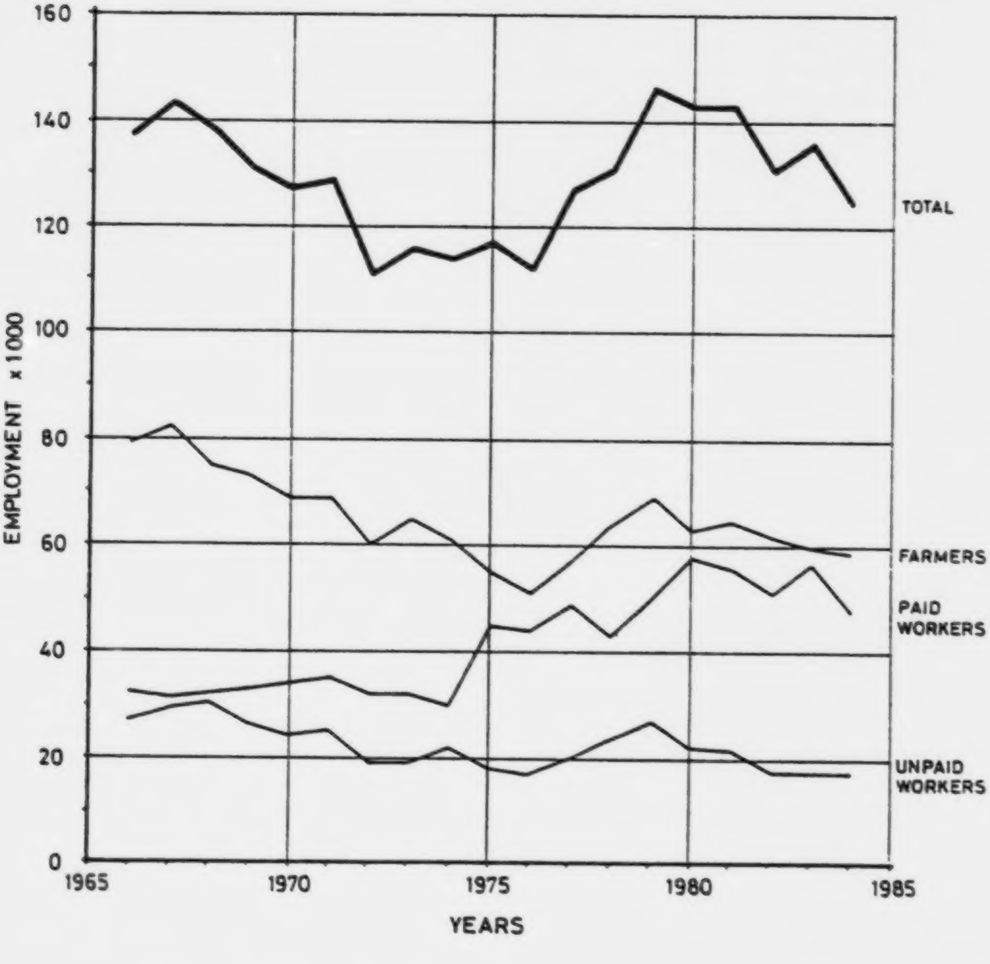

EXHIBIT 2
EMPLOYMENT IN AGRICULTURE
ONTARIO 1966 - 1984

SOURCE: SEE EXHIBIT 1

- drownings while swimming in a farm pond,
- accidents on all terrain cycles, or
- deaths due to natural causes, such as heart attacks or strokes.

The reports also include some fatalities occurring on public roads in which farmers and their vehicles are involved, even if they were not on farm business. Fatalities of children on farms, whether engaged in farm work or not, are also counted in the reports.

These reports therefore present counts of fatalities which occurred on or in the vicinity of farms; but they are not necessarily complete, as there is no guarantee that all fatalities have been brought to the attention of the FSA, directly or through their field staff. However, the method of data collection and presentation assures that the number of fatalities is at least as high as given in these reports.

A fatality is counted by the Mining Health and Safety Branch as a mining fatality if it:

- is work related, and
- occurs on that part of the property of a mining, sand and gravel pit or quarry company on which such operations are carried out, even if the victim is employed by a different company.

It excludes fatalities by mining company employees on public roads and any deaths due to natural causes, such as heart attacks or strokes.

The fatality statistics of the Mining Health and Safety Branch include those occurring in smelters. Smelters are not included in the employment figures for mining obtained from the Labour Force Survey of Statistics Canada.

The definition of a fatality used by the Construction Health and Safety Branch is similar to that of the Mining Health and Safety Branch, as shown below. A death is counted as a construction fatality if it:

- is work related, and
- occurs on a construction site, even if the victim is not employed by a construction company, or
- is off the construction site in special circumstances, eg on the way to or from a landfill site, when it is not due to a typical traffic accident. Each case is decided on its own merits.

Again, fatalities due to natural causes are excluded from the counts.

Since 1984 window cleaning operations fall under the jurisdiction of the Construction Health and Safety Branch. Window cleaners are not counted as construction workers in the employment figures obtained from the Labour Force Survey.

Another data source for fatality counts is the Workers' Compensation Board. This source also includes fatalities as a result of prolonged illness. However, the WCB's main function is to pay compensation, and therefore its information systems are set up mainly to support this function and thus they include data generated for and by it. They are not necessarily designed to provide information for any other purpose. For this reason, fatality counts obtained from the Board would not necessarily agree with those obtained from elsewhere, because definitions and allocations to specific years differ.

Furthermore, as coverage by the WCB is compulsory only for hired workers, comparisons using the WCB data can be made only for this group of workers.

Fatality data were obtained from the WCB's System 57, sorted by the Standard Industrial Classification (SIC) code. However, as reliable fatality data were available from the sources discussed above covering also persons other than hired workers, the data from the WCB were not used for comparisons of fatality rates.

III.2 Data Adjustments

In order to compare fatality rates, a number of adjustments had to be made to the fatality counts obtained from the sources discussed in Section III.1 above. These adjustments put the counts on the same basis.

The fatalities reported by the Farm Safety Association were divided into four groups:

1. Fatalities which occurred on farms but not on highways and where the victims were adults or children engaged in farm work.
2. Fatalities which occurred on highways and where the victims were adults or children engaged in farm work.
3. Fatalities of children* not working, but where the death was farm work related, for example while riding on a tractor.
4. Not farm work related fatalities, whether of a farmer, farm worker or other person.

This grouping was based on the FSA fatality reports and their unpublished support documentation.

Groups 1, 2 and 3 exclude heart attacks and strokes. These have been included in Group 4, although two heart attacks (1981 and 1983) and one stroke (1983) were believed to be closely related to farm work. There were a total of six fatal heart attacks, one fatal stroke and one death from an unspecified natural cause reported for the years 1981 to 1984. All were counted in Group 4.

Group 1 is comparable to the fatalities as they are counted in the mining and construction branches. It is, however, believed that a more realistic picture of the number of fatalities in agriculture is represented by the sum of Groups 1, 2 and 3 plus the two heart attacks and the one stroke now included in Group 4.

---

* Children were defined as persons 15 years of age or less.

The adjustments which were made to the fatality figures of the Mining and the Construction Health and Safety Branches are minor.

Two of the fatalities counted by the Mining Health and Safety Branch in 1982, and one counted in 1983, occurred in smelters. Smelters, as mentioned before, are not part of the mining division in the SIC code, and therefore are not included in the Labour Force Survey employment count for mining. For this reason, these three were subtracted from the official fatality counts for the appropriate years.

In 1984 three fatalities occurred in window cleaning operations. Again, as mentioned before, the employment figures do not include window cleaners as part of the construction industry. Therefore these three fatalities were subtracted from the fatality count of the branch.

The fatality figures for the three industries, the adjustments, the employment and the rates are given in Exhibit 3. The rates are shown graphically in Exhibit 4.

III.3 Comparison of Fatality Rates

A statistical analysis was carried out for the comparison of the fatality rates based on Group 1 for agriculture and the adjusted figures for the other two industries. The rates compared are represented by the heavy shading in Exhibit 4. Exhibit 5 lists the results.

These results show that the fatality rate for agriculture is statistically no different than that for mining, but is significantly higher than that for construction. This means that the difference observed in the fatality rates between agriculture and mining could have happened purely by chance if both were in fact identical. It is, however, unlikely that the difference observed between the rates for agriculture and construction could have happened by chance, if the two were the same.

The statistical technique uses the average rates, the variation of the yearly rates and the number of years. The variation of the yearly rates is, amongst other factors, affected by the variability of the employment figures, discussed in Section II. Therefore the analysis takes account of the effect of the sampling error of the Labour Force Survey data.

The comparisons carried out here are only for fatalities due to traumatic causes. They do not include those due to long term illness.

Furthermore, in these comparisons it must be remembered that mining and construction are now covered by the Occupational Health and Safety Act, and agriculture is not.

EXHIBIT 3
FATALITIES AND FATALITY RATES

	1981	1982	1983	1984
Agriculture:				
Employment (thousands)	143	131	136	125
1. Fatalities(#), farm work, no hwy	28	31	27	34*
Fatality rate	0.020	0.024	0.020	0.027
+ 2. Fatalities(#), farm work, on hwy	31	33	32	38*
Fatality rate	0.022	0.025	0.024	0.030
+ 3. Fatalities(#), children	35	38	38	41*
Fatality rate	0.024	0.029	0.028	0.033
+ 4. Fatalities(#), other(total=FSA)	40	45	48	48*
Fatality rate	0.028	0.034	0.035	0.038
Mining:				
Employment (thousands)	50	36	34	35
Fatalities: Ministry of Labour	14	9	8	16
Adjusted	14	7	7	16
Fatality rate	0.028	0.019	0.021	0.046
Construction:				
Employment (thousands)	216	206	203	219
Fatalities: Ministry of Labour	36	24	24	32*
Adjusted	36	24	24	29*
Fatality rate	0.017	0.012	0.012	0.013

Sources:
- Agriculture fatalities: Farm Safety Association
- Mining fatalities: Ministry of Labour, Mining Health and Safety Branch
- Construction fatalities: Ministry of Labour, Construction Health and Safety Branch
- Employment: as shown in Exhibit 1

Rates measured in fatalities per 100 employment per year

# The fatalities for agriculture are listed cumulatively from Group 1 to 4; the last is the total reported by the FSA.

* Preliminary figures

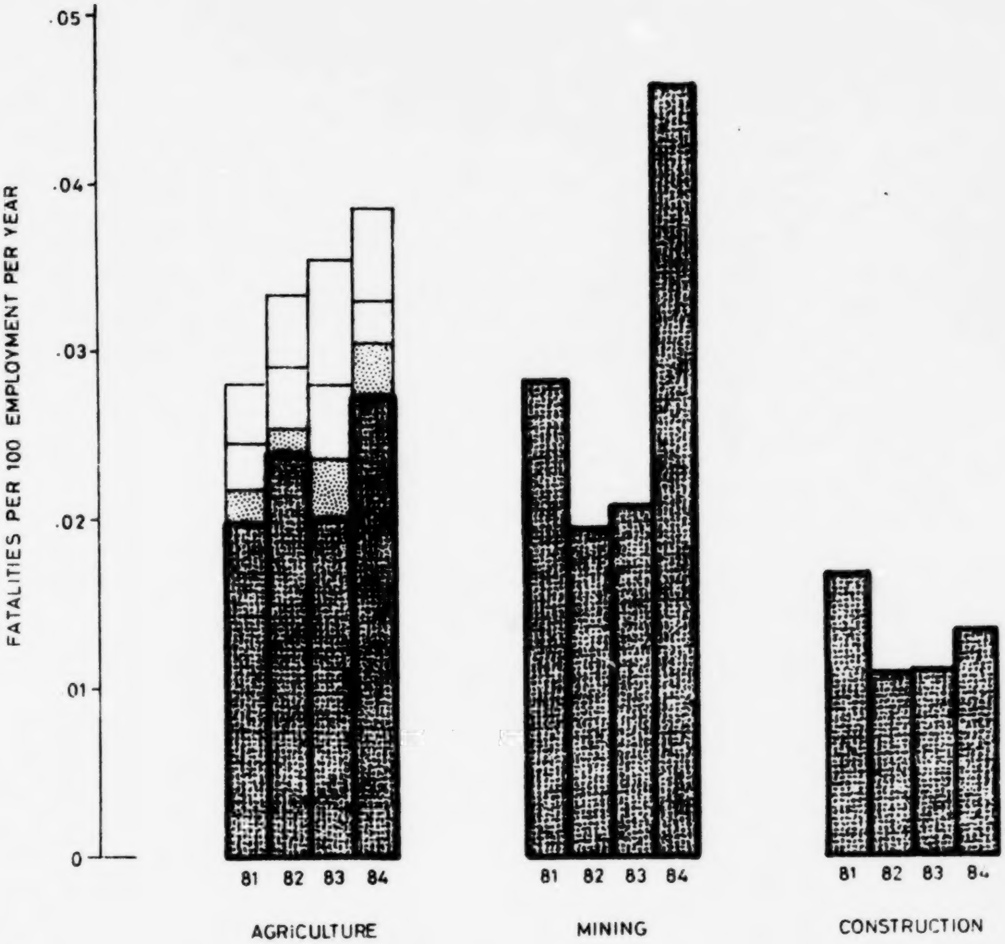

EXHIBIT 4

COMPARISON OF FATALITY RATES

SOURCE: SEE EXHIBIT 3

KEY:

- ▨ WORK RELATED, NOT ON HIGHWAY
- ▒ WORK RELATED, ON HIGHWAY
- ☐ CHILDREN NOT WORKING, BUT FARM WORK RELATED
- ☐ OTHER REPORTED BY FARM SAFETY ASSOC.

} Shown for Agri-culture only

EXHIBIT 5
STATISTICAL COMPARISON OF FATALITY RATES

Industry	Ave. rate	vs.	Industry	Ave. rate	Probability	Conclusion
Agriculture	.0226	-	Mining	.0284	.23 (1:4.3)	No difference
		-	Construction	.0134	.0049 (1:204)	Significant difference

NOTE: The statistical comparison was based on the following approach:

1. *It was assumed as a hypothesis that the average fatality rates were the same.*
2. *Based on this, the probability of getting a difference at least as great as that observed was calculated.*
3. *It was then judged whether this probability was large enough to support the assumption under (1) above.*

Using this approach, it was found that the observed difference in the rates between agriculture and mining could be obtained on the average in about 1 out of 4 cases purely by chance. This is a large probability; therefore there is no convincing evidence that the two rates are not the same.

However, a difference as large as that observed between agriculture and construction could be obtained on the average in only 1 out of 200 cases purely by chance. Such a small probability leads to the conclusion that for this comparison the assumption under (1) should be rejected, i.e. there appears to be a real difference between the two rates. In other words, there is strong evidence that the fatality rate for agriculture is higher than that for construction.

In analyses of this type, the cut-off point between accepting or rejecting the assumption under (1) is usually taken at a probability level between 1 in 20 and 1 in 100.

The calculation of the probabilities in (2) above took into account the average rates, the variation of the annual rates and the number of years on which the averages were based.

IV. SOURCES OF FATALITIES IN AGRICULTURE

Based on the FSA fatality reports of 1981 to 1984, the sources of the fatalities were divided into three catagories:

1. Fatalities where a tractor or tractor drawn implement or trailer was involved;
2. Where other farm machines, including trucks, were involved;
3. Where no machinery was directly involved.

These three categories were in turn drawn up for two groups:

1. Fatalities which occurred on farms or on highways and where the victims were adults or children engaged in farm work.

2. Fatalities of children not working, but where the death was farm work related, for example while riding on a tractor.

In this analysis, fatalities which occurred on public roads were included, as no comparison with mining or construction was intended. However, all heart attack and stroke victims were excluded.

Exhibit 6 presents a table of the results and Exhibit 7 shows them graphically. It is interesting to note that the proportional breakdown between the categories for the two groups is very similar.

The areas of the "pies" in the pie-charts of Exhibit 7 are proportional to the total number of fatalities in 1981 to 1984 for the two groups respectively.

V. LOST TIME INJURIES

Before comparing the lost time injury rates between agriculture on the one hand and mining and construction on the other, the lost time injury data used will be briefly described. As only one source was used, no adjustments were necessary to make the data comparable between the three industries.

V.1 Data Source

There is no agency which records the number of all lost time injuries occurring in Ontario. However, the Workers' Compensation Board keeps records of payments on claims to injured workers covered by the board. These records can be separated into those for hired workers, who have to be covered, and for those who have voluntarily taken out coverage. No count is available of the total number of people who have chosen to cover themselves in this way. However, a count of paid workers is available from Statistics Canada, see Exhibit 1 above. It was assumed that what are called "hired workers" by the WCB are the same as those classified as "paid workers" by Statistics Canada.

Therefore the data available allowed a comparisons of lost time injury rates for hired workers only.

EXHIBIT 6
SOURCES OF FATALITIES
1981 to 1984

Group	Tractor	Other farm machinery	No machinery	Total
Farm work on farm and hwy:				
fatalities	76	30	28	134
percent	56.7	22.4	20.9	100
Children, farm work related:				
fatalities	10	3	5	18
percent	55.5	16.7	27.8	100

Source: Farm Safety Association fatality reports 1981 to 1984 and unpublished supporting documentation.

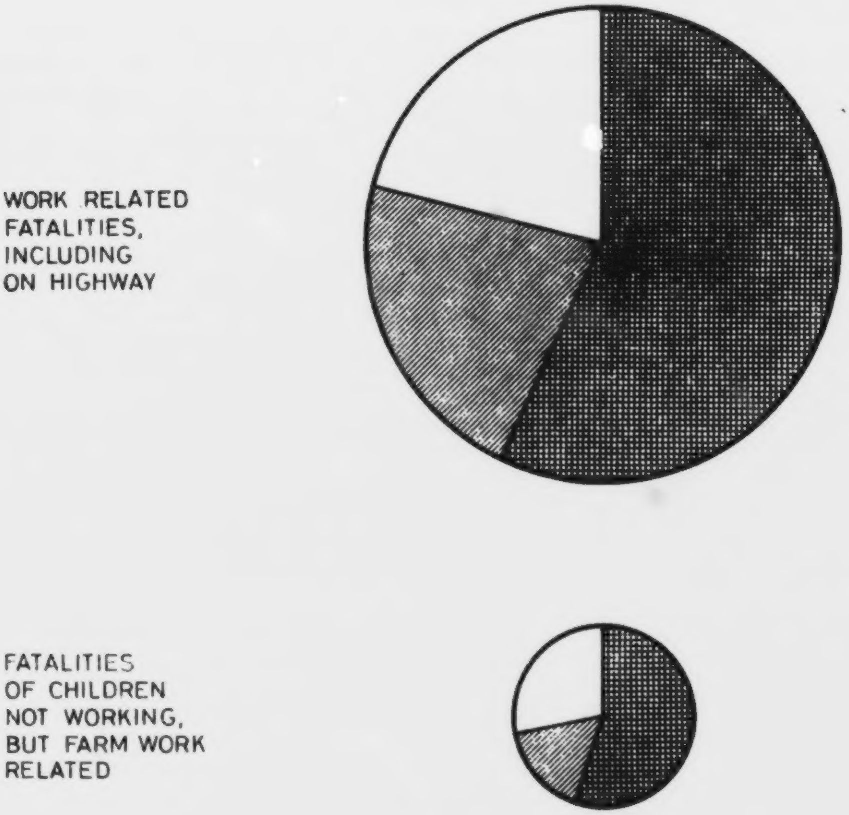

EXHIBIT 7
SOURCES OF FATALITIES
ONTARIO 1981 - 1984

SOURCE : SEE EXHIBIT 6

KEY:

■ TRACTOR OR TRACTOR DRAWN IMPLEMENT
▨ OTHER FARM MACHINERY, INCLUDING TRUCKS
□ NO DIRECT INVOLVEMENT BY MACHINERY

Data on lost time injuries were obtained from the System 57 of the WCB, sorted by the 1970 SIC code and separated into voluntary coverage and hired workers. This allowed the selection of the appropriate injuries to match the employment data from the Labour Force Survey of Statistics Canada. The latter is classified according to the 1980 SIC code. Staff of Statistics Canada has assured the Task Force that for the broad industrial divisions of the comparisons used here, the potential error is negligible, as the 1980 code is to all intents and purposes the 1970 code with greater resolution.

A lost time injury and the year in which it was counted was based on the first payment on a claim. There is, therefore, some "spillover" at the end and the beginning of each year due to the elapsed time from the date of injury to the date of first payment. Furthermore, the figures include the fatalities. However, due to the large numbers involved, the spillover should on the average cancel out, and the fatalities form an insignificantly small proportion of the total number, so that their impact on the analysis can be ignored.

Exhibit 8 shows the number of lost time injuries, the employment for hired workers, and the injury rates for agriculture, mining and construction for 1981 to 1984. Exhibit 9 presents the relationships graphically.

V.2 Comparison of Lost Time Injury Rates

The differences between the injury rate for agriculture and those of the other two industries were tested statistically. As would be expected from an examination of Exhibit 9, these differences were found to be significant. This means that the observed differences would be unlikely to occur purely by chance, if the injury rate of hired workers in agriculture were the same as those in the other two industries. Hence one must conclude that the rates are different.

Why the injury rate of hired workers in agriculture should be significantly lower than that of the other two industries needs further investgation. It should be recalled that the fatality rate in agriculture due to injury alone shows statistically no difference from that of mining and is significantly higher than that of construction.

Part of the explanation for this could be that hired workers may perform on the average tasks in which they are less likely to come into contact with machinery, the main source of injuries (and also fatalities). It has also been indicated to the Task Force that not necessarily all injuries occurring on farms are reported to the WCB. These two resons may explain some of the difference, but whether they explain all of it is not known.

EXHIBIT 8
LOST TIME INJURIES OF HIRED WORKERS

	1981	1982	1983	1984
Agriculture:				
Employment (thousands)	56	51	57	48
Lost time injuries	2,132	1,951	2,231	2,284*
Injury rate	3.81	3.83	3.91	4.76
Mining:				
Employment (thousands)	50	36	33	35
Lost time injuries	3,279	3,101	2,680	2,888*
Injury rate	6.56	8.61	8.12	8.25
Construction:				
Employment (thousands)	180	171	168	181
Lost time injuries	14,134	12,289	12,083	13,391*
Injury rate	7.85	7.19	7.19	7.40

Sources: - Lost time injuries: Workers' Compensation Board, unpublished data.
- Employment: as shown in Exhibit 1.

Rates measured in injuries per 100 employment per year

* Preliminary figures

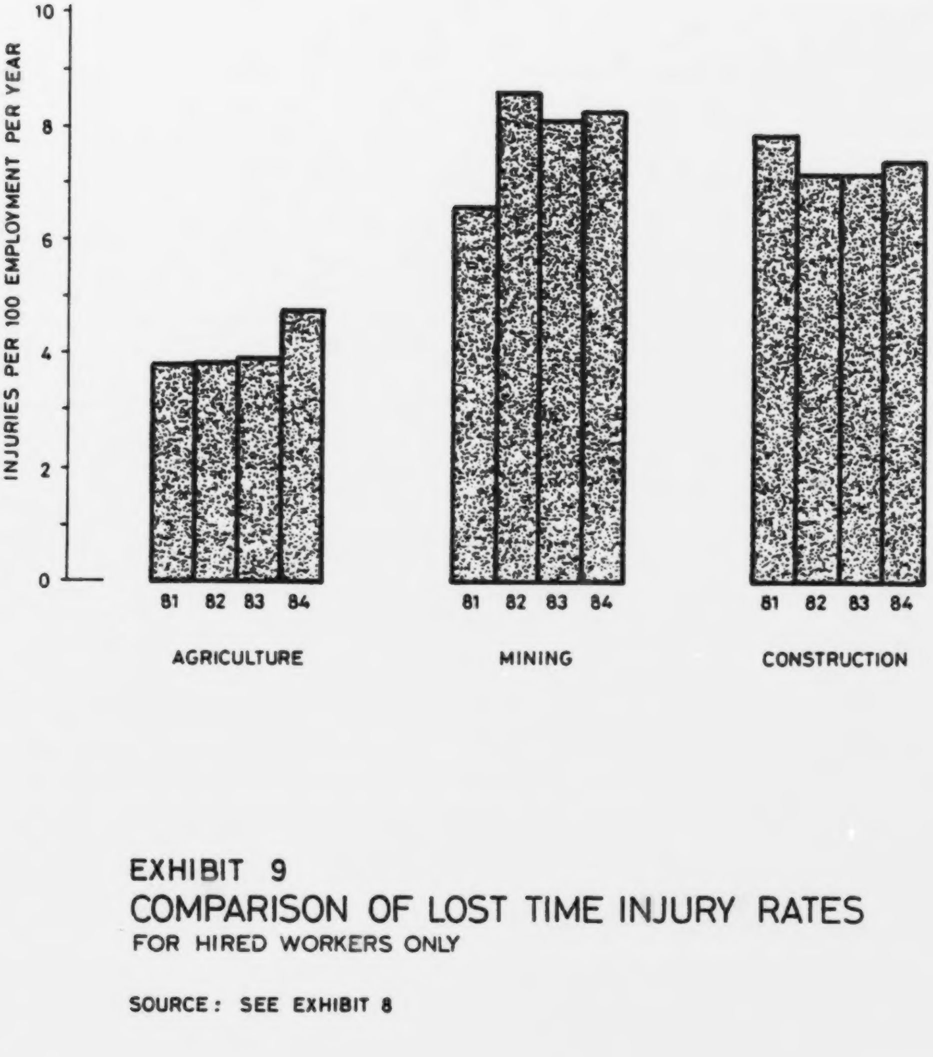

EXHIBIT 9
COMPARISON OF LOST TIME INJURY RATES
FOR HIRED WORKERS ONLY

SOURCE: SEE EXHIBIT 8

APPENDIX 3

SUMMARY OF POTENTIAL HEALTH PROBLEMS ON FARMS

extract from

HEALTH OF PERSONS ENGAGED IN FARM WORK

prepared for the

ONTARIO TASK FORCE ON HEALTH AND SAFETY
IN AGRICULTURE

by

The Occupational Health Program
McMaster University
Hamilton, Ontario

SUMMARY OF POTENTIAL HEALTH PROBLEMS ON FARMS

Introduction

In this document, the scientific literature pertaining to the health of persons engaged in farm work has been reviewed and organized in such a way that would be useful for the Occupational Health and Safety professionals interested in this matter. The objective of this chapter is to summarize and highlight important issues from this comprehensive review. The information presented in this chapter is aimed at the general public and policy planners who are considering priorities for further action that pertain to Ontario.

....

Scope of Potential Health Problems

Farm work in Ontario is a key industry and an examination of potential risks that confront the farmer, farmer's family and farm workers has been commissioned as a first step to examining the potential courses of action to protect and prevent occupational diseases and accidents to persons engaged in farm work in Ontario. In spite of the many shortcomings of the quality of evidence relating farm work and health, the scientific literature contains at present important information of both descriptive and analytical types that is useful to apply to the study of the health of persons engaged in farm work in Ontario. The usefulness of this term can best be demonstrated in the field of mental health. It is clear that some psychiatric disorders can be prevented but, having said that, there is also a difference between individuals who are "coping" and individuals who are "thriving". In this field, prevention only seeks to ensure that people are coping, that they are free from psychiatric illness. Health promotion also aims to produce thriving, fulfilled people. It is interesting to note that health promotion seems much more in tune with the World Health Organization's definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

A widely used classification divides prevention into three types according to the purpose of the activity. Primary prevention seeks to prevent diseases or accidents from ever occuring. Secondary prevention tries to detect disease in the earliest stages and while it is still treatable. Screening falls into this category. Tertiary prevention attempts to prevent deterioration in established disease. Attempts at health promotion introduce the added goal of well-being.

The scope or range of preventive measures can be illustrated by reference to another widely used classification, this time concerning the variables in the dynamic processes which determine our health - agent, host and environment.

An agent is taken as any specific substance or environmental condition that acts on people to produce disease. Biological agents, such as bacteria are responsible for infectious diseases while organic and inorganic substances produce acute and chronic conditions. Agents can be identified both within and outside the human body and may act singly or in combination. There is therefore very wide scope for actions that can be taken to achieve primary prevention. They range from the control of airborne chemicals or dust in industrial processes to regulations governing the preparation of food.

Agents obviously vary in their potency just as hosts vary in their susceptibility - the environment affects them both and the relationship between them. Prevention through action on the environment can moderate the biological environment; the chemical environment; the physical environment; the social environment and the economic environment.

Actions directed at the hosts are generally concerned with immunity to the effects of particular agents, with health education and with other preventive services. Immunity is partly developed naturally and partly acquired through immunization. Of importance in determining the spread of epidemics is the proportion of the population with immunity. If this is sufficiently high, then epidemics can be slowed down or stopped in rather the same way as firebreaks act to control forest fires. Such simple opportunities to prevent illness from chemical hazards do not exist and emphasis on the latter two approaches must be considered.

The scope for action on hosts is increased when health education and preventive services such as screening are implemented.

When considering the range and type of prevention necessary in Ontario, whether in the form of services or other actions, it is clear that it should be related to the burden of accidents, illness and mortality actually present in Ontario. There is a clear trend in patterns of mortality related to economic and social change. In industrialized countries, for example, at the end of the 19th century and in the 20th there was a decline in the toll of infectious diseases and an associated increase in chronic and degenerative conditions.

Three important points can be drawn from studies of this process. First, the major falls in mortality came before the advent of modern methods of medical treatment. The improvements in health were largely a result of better nutrition, cleaner water supplies and safer waste disposal. Modern scientific medicine played a relatively minor role. The argument that health is not the result of simply providing health services is also supported by experiments in developing countries. The literature contains at present important information of both descriptive and analytical types that is useful to apply to the study of the health of persons engaged in farm work in Ontario.

Machinery and chemicals are used throughout the agricultural cycle. Tractors, spray rigs, moveable tins, conveyor belts, hauling trucks, ladders, hoes, axes and saws are all used routinely by farmers. These dangers are clearly visible, however, the health risks posed by agricultural chemicals be more ubiquitous. The reason for this is that these problems are chronic diseases that take often many years to develop from the time of initial exposure to the recognition of an adverse health effect. The time period between the exposure and the presentation of disease is called the latency period and often with respect to cancer, this may take a period of 15 to 20 years to develop. The recognition of reproductive disorders are in contrast much more immediate but the linking of a particular occupational exposure such as a pesticide and the adverse reproductive event such as a spontaneous abortion, birth defect, or behavioral problem in an offspring may be more difficult to relate due to the complex nature of the stages of human development. Neurological disorders are often very subtle and hard to recognize early in their course of development. By the time a major disease of the brain is diagnosed by current medical technology, the condition is usually irreversible and resistant to current modes of medical therapy.

The application of the large body of scientific literature specifically to agricultural conditions in Ontario is a much more difficult task for several reasons. There is a general lack of information available regarding exposure to pesticides and organic chemicals in Ontario. There is also a lack of awareness on the part of the agricultural community and the medical community as to the dangers involved with exposure to these toxic substances. The information collection system for agricultural health and safety in Ontario is clearly inadequate. For example, basic hospital medical records and government morbidity and mortality statistics do not have necessary information of sufficient reliability and validity to assess the relationship between occupational diseases and specific chemical exposures. The occupation of a person with a specific disease that may cause an admission to hospital or ultimately result in death, is currently not recorded and if any relationship is to be drawn, complex record linkage with computer data bases are required. This is very time consuming and expensive. Other approaches to actually search and trace the occupation of the individual stricken with a disease are very time consuming and tedious and may not necessarily result in valid relationships being drawn.

Another possible reason for the general lack of information concerning the health of persons engaged in farm work in Ontario stems from the difficulty in carrying out scientific field studies of agricultural workers. It is well known that there are more agricultural farm workers in the world than any other occupational group. In many respects this group of workers has the broadest and most extensive of occupational exposures to biological, chemical, and physical agents of disease or injury. Even though in this document a comprehensive review of all available scientific information has been carried out, the full spectrum of all health hazards to these workers remains obscure with respect to a well-defined population at risk. The nature of the agriculture community makes this difficult as often there are many migrant workers involved in seasonal types of work activities. This makes following persons exposed to a particular hazardous substance over many years of time very difficult and therefore the end result in terms of burden of disease often cannot be established with certainty. Also the nature of farm work is such that a given individual farmer may be exposed to many different types of hazards and may make the association between specific occupational exposures and the disease difficult.

The challenges confronting the scientists designing field studies of farm workers include the wide variety of diseases related to the work task involved, the highly changeable work environment, frequency and mobility of workers and work, the absence of high quality medical care and record keeping, the lack of data related to the nature and degree of occupational exposures, and the absence of measurable indices for subtle monitoring of health effects from farm work.

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In spite of these methodological challenges, a number of key studies have been carried out in the world. A study done in Southwestern Ontario by Sullivan et al during the summer of 1979 attempted to address the problems encountered during the course of their work. Their conclusions were that the health consequences of the many hazards were probably much underestimated. Much of their analysis focused on farm accidents; however, they did express concern about the effects of toxic chemicals.

Other studies concerning the general health of farm workers include those by Gallagher (1984), Stubbs (1984), Burmeister and Morgan (1982), Carlson and Peterson (1978), Bleiweis (1977), Husman (1982), Thelin (1980), and Dubrisay and Pages (1978) which all point to the unusually high rate of mortality among farmers from the various types of diseases and accidents. Husman in his study concluded that occupational health services to farmers should be aimed at the prevention of accidents and diseases of the skin, respiratory and musculo-skeletal system. Navakatikian (1980) noted that among machine operators, the rates of chronic bronchitis, digestive disturbance and hearing loss seem to have now decreased due to design of machinery, while cardiovascular and nervous disorders have shown an increasing trend due to intensification of work. Studies conducted by Suskind and Hertzberg (1984), Morgan (1980) and Wang and MacMahon (1979), show unusually frequent skin problems among workers exposed to different pesticides. Other researchers such as Lang (1982) and Ditraglia (1981) showed workers exposed to various pesticides have significantly higher rates of lung fibrosis, pneumonia, and respiratory disease.

Health problems among farm workers exposed to agricultural chemicals are varied and affect many different systems. Acute health problems such as neurological disorders caused by these chemical exposures are easier to document than chronic diseases. Farm workers are exposed to a wide range of chemicals in their workplace and therefore it is often very difficult to point out one chemical as the cause of the problem, particularly in terms of the development of chronic illnesses. One example of this is a study by Bogden (1975) which attempted to delineate the deleterious effect which pesticide exposure may have on migrant farm workers. They concluded that four major categories of pesticides: 1) heavy metal-containing substances, 2) chlorinated hydrocarbons, 3) carbamates, and 4) organophosphates, present a major hazard and perhaps the most serious with regard to migrant farm workers, was organophosphates. In Ontario with offshore workers from the Caribbean and Mexico, migrant workers from Quebec and Northern Ontario, and the large resident immigrant population, a similar situation exists. Many of these workers are unaware of the dangers and the symptoms of pesticide poisoning. Should a possible problem arise, these workers are currently without protective legislation.

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The next section identifies major priority health problems among persons engaged in farm work. The summaries on each specific condition are related back to the in-depth literature reviews done in previous chapters. The nature of the scientific information is discussed from an interpretive point of view.

Ten Priority Health Problems Among Persons Engaged in Farm Work

Problem 1 - Cancer

There is mounting evidence in the scientific literature that modern farming practices may lead to a significantly greater risk of dying from certain kinds of cancer.

Reviews carried out by Health and Welfare Canada (1982) and Blair (1982) point to specific cancers such as leukemia, (a cancer of the blood), lymphoma (a cancer attacking the lymphatic system) and multiple myeloma (a cancer that attacks the bone and bone marrow). These reviews suggest that the risk of developing these types of cancers are elevated in certain types of farming, for example across poultry, dairy, grain, livestock as well as general farming.

The specific cause of these types of cancer has yet to be identified from the many studies reviewed. Many of the studies published have been done in the mid-western United States. For this reason, for example, leukemia has been implicated in corn production and more specifically, the fertilizer type used may in fact be the true causal agent. Burmeister (1982) found this relationship linked to corn produced per acre as well as the number of milk cows and the number of egg-laying chickens. The study by Blair and Thomas (1979) also suggested a relationship to heavy corn-producing counties. Blair and White (1981) found also that there were elevated risks to the development of leukemia in those counties with heavy dairy production and fertilizer use. Other suggestions from the studies by Milham (1971) and Priester (1970) relate dairy farming to leukemia as well as other types of blood cancer. Many other studies have related lymphoma and Hodgkin's disease to farming. These studies however are not as detailed and do not distinguish between types of farming or any suspicious exposures. There is more suggestive evidence relating multiple myeloma but again no specific agent or type of farming has been implicated.

Cancer of the respiratory tract including nasal cancer, laryngeal cancer (throat cancer) and lung cancer suggest a relationship to different types of farm chemicals. For example, Hardell (1982) suggested that chlorphenols present in wood dust are related to nasal cancer, however, Hemberg (1983) did not find any relationship. With regards to lung cancer Blair (1983) found an elevated rate among pesticide applicators and Rothschild and Mulvey (1982) found an elevated risk among sugar cane farm workers. There is suggestive evidence that pesticides, particularly of the organophosphorous and organochlorine types, are the putative agents as has been suggested in many animal studies. The confounding factor of cigarette smoking, however, was not well-controlled for.

Soft tissue sarcoma, a rare type of connective tissue cancer, has been a topic of much research due to a suggested link with a chemical called 2,4,5-T, a phenoxy acid. Balarajan and Acheson (1984), Hardell and Sandstrom (1979) and Eriksson (1981) have done studies that demonstrate some type of relationship. There are other studies such as Zack and Suskind (1980), Cook (1980) and Ott (1980) which did not find a relationship, however, those studies were done in manufacturing situations. Animal evidence gives these possible associations some biological plausibility.

A large number of studies have demonstrated an increased risk of stomach cancer with farming. These studies done again in Iowa by Burmeister (1983, 1981) and Bueschling and Wollstad (1984) and Armijo (1975) have pointed to a problem. There is only a slight suggestion that this may be related to dairy farming and/or nitrate fertilizer usage. This relates back to some evidence that N-nitroso compounds induced tumors in animals. There are a few other human studies that relate to liver cancer, pancreatic cancer and colorectal cancer in farming.

Cancer of the male reproductive system such as testicular cancer and prostatic cancer has been explored by a number of studies which demonstrate conflicting evidence for and against an association with farming. Further studies clearly need to be done. Bladder cancer elevated risk has been demonstrated in two older studies, one by Milham (1974) and Decoufle (1973) in wheat and cattle farmers, however this has not been confirmed among dairy farmers in a study by Blair and Watts (1980).

Elevated risks of brain cancer have been demonstrated in a number of different types of groups including those exposed to insecticides and as well dairy and cattle farmers. The studies were more descriptive in nature and point to a potential problem and further research must be done. Skin cancer has been linked in agricultural workers by studies by Lindqvist (1981), Wiklund (1981) and Whitaker. The main exposure of concern is that to ultra-violet radiation from the sun.

The possibility of a cancer problem among Ontario farm workers remains to be explored. This area is a very high priority and needs to be acted upon as soon as possible. One of the recommendations of this report is to set up a comprehensive health surveillance system that will monitor cancers in Ontario and link them to occupational exposures including that of farm work. A large scale case-control study could be organized if this type of surveillance system was in place. Linkages with centres of expertise in epidemiologic research could carry this analysis further to explore not only the type of farming but specific exposures encountered such as that to agricultural chemicals.

Until these relationships are recognized, comprehensive preventive approaches to reducing the risk of the development of cancer among farm workers will be obscured due to lack of data. Inferences and projections from laboratory toxicological data in animal studies are useful adjuncts to human toxicological information and have been helpful to pointing out the potential problem situation. The epidemiological studies that have been reviewed identify the existence of a problem that may confront persons engaged in farm work in Ontario. These and other studies have been summarized in tables reviewed in Chapter Four of this document. They are extensively examined with respect to the quality of evidence with regard to causation.

Problem 2 - Reproductive Hazards

The effect of farm work on reproduction may disrupt both male and female processes as well as poison the developing embryo and fetus. Human reproduction is very complex and exposures such as that of agricultural chemicals may disrupt these delicate processes at any point. Shepard (1983) has listed hundreds of chemicals that may affect the reproduction of animals, however, few of them have been confirmed to adversely affect human reproduction. The type of reproductive problems that can be expected are disrupted sperm production in the male and menstrual irregularities in the female. Problems such as spontaneous abortions, premature infants, stillbirths and neonatal death, and most importantly congenital malformations can all be related to occupational exposures.

Whorton (1977 and 1979) has observed that a chemical DBCP has disrupted sperm production dramatically in exposed male workers. Levine (1983) confirmed this relationship. Insecticides such as carbaryl have been found by Wyrobek (1981) to have a similar affect on sperm.

Spontaneous abortion has been a topic of much study in Finland especially by Hemminki (1980 and 1981). Finland has a sophisticated adverse reproductive event surveillance system such that any possible relationship to occupation can be explored comprehensively. From his data there is some suggestion that agricultural chemicals are related to spontaneous abortions.

Congenital malformations have been the most important reproductive problem that has undergone study. The report of the New Brunswick Task Force on Chemicals in the Environment by Hatcher and White (1985) has related agricultural chemical exposure to elevated rates of adverse reproductive outcomes in the Saint John River Basin area. Initially it was suggested that chemicals from the forestry spraying were the causal factors, however, their study demonstrates a clearer relationship to that of exposure to agricultural chemicals. Williams (1981) investigated the risks of congenital anomalies in the Holland Marsh area in Ontario, however, the study was not conclusive. Further more sophisticated studies such as the New Brunswick investigation are required to further explore a possible relationship. Other studies from around the world include that of the mid-western United States, New Zealand, Australia, and England and Wales. These implicate agricultural chemicals as being associated with types of congenital malformations involving the neural tube of the developing human.

It must not be forgotten that exposures to the mother in the post-natal period after birth may also adversely affect an infant. A number of examples such as that of 2,4-D, methoxychlor and various insecticides including organophosphates and carbamates have been shown to be transmitted through the breast milk to the baby. These have resulted in a number of problems such as endocrine abnormalities as well as the possible risk of cancer later in childhood.

The evidence from the scientific literature indicates that exposures encountered in both males and females from farm work can disrupt human reproduction at a number of critical points. Not only does this problem in Ontario need to be researched more carefully, but farm workers must be made aware of the potential hazards so that preventive strategies can be initiated. Personal tragedies are inevitably involved when defects are present at birth or appear in later life. The need for detection of toxic agents to the embryo and fetus, the assessment of health risks, and the prevention of unfavourable outcomes of pregnancy need to be given much higher priority. Differences between animals and humans in metabolism, inherent sensitivity, and levels of exposure may be responsible for the differences observed between animal studies and human observations. Among the problems in conducting epidemiological studies is the detection of chemically induced anomalies against a background of sporadic defects. The size of scientific studies necessary to detect changes in the rates of some rare abnormalities is so great that such studies may not be feasible. Smaller studies may have problems which result in innacurate risk estimates.

An improved centralized system of registering birth defects and the input of occupation onto hospital admission forms would assist in the monitoring and prevention of congenital malformations induced by parental occupational exposure to hazardous substances. Although it is difficult to pinpoint teratogenic agents based on changes in the rates of a particular defect or constellation of defects, monitoring systems can provide clues to hypothesis testing in epidemiological investigations. Monitoring systems have been established on an international basis and are beginning to be established in Canada. Unless these efforts are supported they will always suffer from incomplete and possibly unreliable information. It is important to note that in Ontario, an extensive and complete surveillance system exists for infectious diseases. The Ontario Ministry of Health monitors notifiable diseases such as influenza and sexually transmitted diseases. Trends are reported frequently to all health professionals concerned with the recognition and prevention of these infectious dieases. It is well within the capability of existing structures in Ontario to provide a similar type of surveillance for adverse reproductive events.

Problem 3 - Neurological Diseases

Diseases of the nervous system including the brain, spinal cord, peripheral nerves and muscles have been well understood and investigated for many years. Pesticides used in farming have been implicated in the cause of these diseases both acutely and in chronic forms.

Agriculture makes use of large quantities of various organophosphorus pesticides. Although these pesticides differ much from each other with regard to the degree of toxicity, and to physical, chemical, and biological properties, they have a number of effects in common which affect primarily the nervous system. These compounds are used widely in agriculture to control insect pests, acarids, nematodes, plant diseases, and weeds. They are extensively used on fruit trees such as apple, pear, plum and citrus trees, vegetable crops, ornamental plants, cotton and cereal crops. These pesticides are rapidly absorbed through the mucus membranes of the digestive tract, respiratory system and skin and are conveyed by the blood to various body tissues.

Certain compounds are active cholinesterase inhibitors and others are transformed into such inhibitors after absorption in tissues. This process is carried out by the liver and can interact with other chemicals or drugs. The mechanism of toxic action is an inhibition of the esterase enzyme activity, in particular cholinesterase, which plays an important physiological role. This affects both the central and autonomic nervous systems where acetylcholine acts as a mediator nerve impulse.

The initial symptoms in their most severe presentation may include convulsions and paralysis. The first stage of poisoning is characterized by anxiety, nausea, salivation, vomiting, abdominal pains, diarrhea, blurred vision and excessive tearing. The early symptoms of poisoning such as dizziness, nervousness, anxiety and agitation may be present before or after the nausea occurs. Symptoms of moderate poisoning are headache, impairment of sensitivity or feeling, sleeplessness or on the contrary sleepiness, confusion, ataxia or staggering, tremor of the hands and head, loss of orientation and speech disturbances. At later stages blood pressure may become unstable before death and pulmonary edema and collapse may occur. Loss of control of urine and feces occurs. Finally respiratory paralysis results in death. After an episode of acute poisoning, headache, dizziness, sleepiness, loss of appetite and general weakness may last for many weeks or even months. Problems such as trembling of the hands, nystagmus (a visual control problem), and psychic disorders may occur after an acute toxic event.

The diagnosis of organophosphorus poisoning is made by the measurement of a pronounced decrease of the blood cholinesterase activity in the blood. In mild cases the level may not be depressed significantly as often the blood test sample is not taken at the optimum time of acute poisoning. This diagnostic test usually indicates significant exposure if depressed and eventually returns to normal if exposure is stopped. Treatment is well understood with the use of atropine and pralidoxime.

The recognition of this condition is problematic. Many physicians have not been trained adequately in recognition of acute toxic exposures such as that of organophosphorus and/or carbamate compounds. The latter type of poisoning has a similar mechanism and clinical presentation, however, the treatment is different. The addition of pralidoxime must not be initiated for the management of acute syndrome. The manifestations of chronic poisoning are therefore often unrecognized as the subtle neurological problems may be confused with other types of conditions.

The issue of delayed neurotoxicity is one of growing controversy. The clearest understanding of the mechanism of this phenomenon, which involves a delayed destruction of peripheral nerves after exposure to organophosphates, is described by Lotti (1984). A screening test called neurotoxicesterase may be used to monitor for chronic effects, however, this is yet to be tested in field studies. This would be an area of high-priority research given the large extent of exposure to these types of compounds in Ontario.

Hirshberg and Lerman (1984) describe a computerized medical information system which is able to track and cross-tabulate data with regards to patients who were poisoned with organophosphate pesticides. This type of information database will be crucial to the further understanding of the acute and chronic problems from these types of incidents.

The basic approach to prevention of pesticides poisonings and therefore the reduction of neurological diseases lies in proper storage and preparation of pesticides, proper spraying techniques with minimization of exposure during spraying, and the implementation of spraying time and rules. Personal protective equipment may be used to minimize exposure through the respiratory tract to the skin, however, problems with comfort and heat often limit the feasibility of long-term wearing of these devices. Medical surveillance may be of use to monitor blood cholinesterase levels and in certain jurisdictions this is mandatory. Proper medical aid must be available through local emergency departments.

These preventive strategies are easily stated, however, the implementation of this in the field and within the health care system will be a major challenge for Ontario. Persons engaged in farm work are not educated as to the toxic affects of these types of substances and therefore the health problems are often unrecognized. Blood testing is not carried out on a systematic basis and this may be a priority area for legislative intervention. Emergency departments are generally not equipped or prepared to deal with toxic emergencies of this sort. Through an extensive physician education program it has been proposed that the recognition and treatment of pesticide poisoning would be a high priority topic.

Further research must be carried out into the chronic effects of these neurotoxic substances as the scientific literature has only begun to reflect an understanding of this phenomenon.

Problem 4 - Skin Disorders

Any abnormality caused directly or indirectly by the work environment is an occupational skin disorder. Work-related skin reactions from farm work are as varied as the environments in which people work, although contact dermatitis may be by far the most common problem. The skin is the boundary between humans and their surroundings and it is therefore very often the first site exposed to environmental contact. Farm workers have a definite risk of developing work-related skin disease compared to other industries.

The human skin except for the palms and soles is quite thin; yet its variable thickness, its collagen and elastic components allow it to function as a flexible barrier. It is a unique shield which protects within limits against mechanical trauma, penetration by various chemical agents, water loss from within, microorganisms, natural and artificial light, and stress levels of heat and cold. The various layers including the outer layer of dead cells (keratin) are susceptible to organic or inorganic alkaline compounds. These compounds tend to soften but not dissolve the keratin cells preserving the intactness of this layer. Other types of substances such as solvents will also weaken the barrier effect and thus allow other chemical agents to enter the body. Ultraviolet radiation protection is provided by the pigment (melanin) manufactured by the melanocytes located in the basal cells of the epidermis. The heat exchanging effect is essential to life. This includes sweat gland function, vascular dilation and constriction, and nervous control. Disruption of these mechanisms result in heat and cold disturbances. More recently the immune function of the skin has been recognized and these disturbances may result in types of hypersensitivity rashes.

The causes of skin disorders among farm workers can be classified as mechanical, physical, biological and chemical. Predisposing factors may include race, skin type, other skin disease such as acne, eczemas and fungal diseases, and general lack of cleanliness.

The symptoms of skin disorders may be characterized by an acute contact eczematous or weepy dermatitis. These are clearly the most common type of rashes seen and they may develop into a chronic problem. These are often hard to treat and require cessation of exposure and creams of various pharmacological types. Other types of reactions include photosensitivity dermatitis, which can be problematic for a farm worker exposed to sunlight. Many types of chemicals such as creosote, pitch and anthracene as well as drugs can cause a photoreactive response in the skin. Some types of plants of the family umbelliferae can cause a similar reaction. These plants include cow parsnip, celery, wild carrot, fennell and dill. Acneforme lesions and folliculitis can occur in workers exposed to heavy soilage. These occur anywhere on the body, especially on the forearms, thighs and buttocks. Acneforme rashes are related to a number of agricultural chemicals, especially those contaminated with dioxin. Chloracne is an important skin disease that should be investigated among Ontario Farm workers.

Very common sweat-induced reactions (prickly heat) are found among farm workers. Pigmentation changes can occur induced by hydroquinone compounds which may be used during the course of farm work. Various ulcerations can be induced by compounds containing chemicals such as chromic acids, potassium dichromate and arsenic to name a few.

The most serious concern is that of malignant disease of the various layers of the skin. These may occur from the squamous cell layer, basal cell layer, and melanocytes. A high index of suspicion must be maintained with regard to any type of new growths on the skin and biopsies must be taken to clarify the diagnosis. By far the exposure to ultraviolet radiation is the main potentiating factor, however, certain agricultural chemicals may also have some role to play.

The diagnosis of occupational skin diseases are complex especially if chronic in nature. If an allergic type response is suspected or documented, the management of the job placement is difficult. Cessation of exposure will help the condition, however, upon re-exposure the symptoms may reappear often with increasing response. Prevention by minimization of exposure to the skin is crucial. By meticulous hygiene practice as well as the use of protective equipment to minimize cutaneous exposure, the problem of sensitization may be diminished. Patch testing of the skin may be useful either as a preplacement examination or as a diagnostic manoeuver to understand an immune response to an occupational or non-occupational exposure. Appropriate medical and referral of services must be provided to farm workers so that these very common and often serious disorders can be managed properly.

Problem 5 - Lung Diseases

Farm workers' lung diseases can be related to many types of exposures that occur during the course of farm work. Respiratory problems that present a shortness of breath can be related to three common causes: 1) Occupational asthma is usually recognized by the patient as being associated with specific activities. Commonly it starts shortly after he or she enters a particular area or is exposed to a certain substance. It also may be associated with a runny nose or tearing of the eyes, 2) Farmer's lung, which is very common typically presents as an acute attack of fever, malaise and breathlessness four to six hours after handling mouldy stored hay, and 3) Silo filler's lung occurs after exposure to oxides of nitrogen from the top of an unventilated silo. These types of diseases are well reviewed by Seaton (1984).

Farmers's lung will be common in dairy farmers who are exposed to a large amount of hay which may be mouldy. Exposure to organisms including the various types of fungii such as micropolyspora faeni, thermonospora virrdis, and thermoactinomyces candidus induce a general type of allergic disease. This problem often can be misdiagnosed by doctors as being a common cold, flu, bronchitis or pneumonia and it is not surprising that the prevalence of this condition is underestimated.

Wells (1980) did a review of farmer's lung for the Farm Safety Association of Ontario and concluded: 1) The possibility of farmer's lung should be considered in any farm worker suffering from breathlessness without evidence of cardiac failure or airways obstruction, 2) Farm workers who have an acute reaction to fungal spores on exposure, are often diagnosed as suffering from pneumonia.

In many instances, it is only after a lengthy attempt at treatment of an unresponsive respiratory problem that other causes and treatments are considered. The acute case of farmer's lung is not difficult to diagnose provided a proper history is taken. A subacute response to the spores can be diagnosed by antibody response from a blood sample. Other interactions with respiratory insults such as silo gas and other allergens should be considered. This is particularly of significance in the beef, dairy and pork producers.

An evaluation of the prevalence of farmer's lung, including acute and subacute cases, among individuals in the Ontario agriculture community has yet to be done and is a high priority for research. It is important to know that if the disorder is undiagnosed and chronic exposure continues an increasingly severe and irreversible lung fibrosis may occur. Again physician education is of prime importance and in keeping with a recommendation of this report, farmer's lung is a high priority topic for this type of educational intervention. Improved diagnostic and treatment capabilities among Ontario physicians would lead to further recognition and prevention of this common problem.

Grain handlers diseases is a topic well researched both in Ontario and the Prairie Provinces in Canada. Broder (1984) has investigated the respiratory health of workers in grain elevators before and soon after they were hired. The findings indicate the occurrence of a change in the respiratory status after a relatively brief duration of employment. The presence of phenol in grain dust extract leads to the formation of what appears to be a tannin-like material which accounts for the IgG precipitating activity and much complement fixing activity. This may be indicative of the type of reaction that is implicated in this lung disease.

Many large epidemiological studies by Cotton (1983), Warren and Manfreda (1983) and Dosman (1981 and 1977) have been done which has documented decrement in lung function tests as well as increased symptomology and lung disease among grain farmers. Similar studies by Chan-Yeung (1981) among grain elevator workers in Vancouver documented the prevalence of respiratory symptoms and lung function findings. Adjustment was made for smoking habits among grain workers, the decline of lung function was not correlated with the initial lung function, presence of respiratory symptoms, atopic status, or duration of exposure. It was, however, correlated with acute changes in lung function over the course of one work shift and one work week. The conclusion was that grain dust has a deleterious affect on lung function of workers and should not be regarded as a nuisance dust.

Silo-filler disease is only part of a major hazard that is posed by silos on Ontario farms. In the modern air-tight silo (harvestore), fermentation of corn produces carbon dioxide consuming the available oxygen in the process. Within a short period of time there may be no detectable oxygen within the unit. A person entering the silo may lose consciousness almost immediately, so quickly in fact that he is probably incapable of saving himself, even if he recognizes that he is in trouble. The hazard in the non-airtight tower silo is different. Degradation of the silo contents produces nitrogen dioxide gas and carbon dioxide. The nitrogen dioxide forms a layer on top of the ensilaged fodder. Above this layer, which may be of variable depth, is normal air. Thus, an individual preparing to enter the silo from above encounters breathable air and may be misled into believing that the atmosphere within the silo is safe. Only after dropping down to the top of the fodder does he encounter the oxygen depleted air and nitrogen dioxide. Illness in which the symptoms do not manifest themselves for several hours may follow inhalation of sublethal concentrations of nitrogen dioxide. Worker education with regards to these types of hazards is paramount to the prevention of these disasters.

Farm workers on hog farms may be at risk of developing respiratory problems related to exposure to manure gases. Gas is heavier than air and collects in a tank or pit either in the confinement unit or outside. Agitation occurs during mechanical movement of the waste releasing noxious gases such as hydrogen sulphide. The study by O'Blenis (1984) done in Ontario explored a number of occupational health problems which include lung problems. A variety of exposures including airborne dust, ammonia, carbon dioxide, hydrogen sulphide, methane and carbon monoxide was considered. It was recommended that to draw further conclusions about decline in respiratory functions, a repeat survey must be carried out at a later date. Donham (1984) has initiated a survey of respiratory function in swine confinement buildings. Initially, a high prevalence of chronic respiratory disease has been documented and further research is required.

Reaction to mushroom spores can result in mushroom worker's lung. Even though a specific antigen has not been identified, a hypersensitivity reaction which can result in severe lung fibrosis and alveolitis may result. Removal of contact from the compost was necessary to limit the progression of the disease. Among tobacco workers, tobacco sickness characterized by a feeling of generalized weakness followed by severe nausea and protracted vomiting is caused by absorption of nicotine from the green leaves of tobacco.

The scope of respiratory diseases among farm workers in Ontario is widespread and requires greater awareness among physicians as well as farm workers. Specific conditions such as farmer's lung are often mistaken for other conditions and education programs directed at physicians in rural areas would hopefully alleviate some of the under-recognition of this problem. Preventive interventions such as improved ventilation can be carried out and approved respiratory protective devices can be distributed where necessary. Over long periods of time, however, these devices may not be comfortable and compliance would decrease especially on long hot summer days. Certain individuals have difficulty wearing them or breathing through them. Knowledge of the type of hazard and the risk to health may serve to increase compliance with these devices.

Further research is required to document the prevalence and extent of diseases such as farmer's lung in Ontario. Since most of these communities are served largely by family physicians, a sentinel physician system, whereby designated family physicians would report to a central source and monitor the trends of the newly recognized diseases, could improve the surveillance of these disorders. A similar system has been used for monitoring infectious diseases in Ontario.

Problem 6 - Infectious Diseases

Several types of animal-borne diseases are common among farm workers and will be described as follows.

Leptospirosis is a disease that mimics influenza consisting of fevers, chills, headaches, backaches, muscle tenderness, nausea, vomitting and lethargy. This occurs through direct or indirect contact with infected cattle or hogs as well as contact with abortion tissues, feces, slurry, urine, contaminated waters and soil.

Salmonella produces diarrhea, mild inflammation of the stomach and gastrointestinal tract and blood poisoning. The organisms are commonly found in sheep, calves, turkeys, chicken, swine, and dogs. Contact with infected animals as well as their feces and urine and contaminated egg powder or raw eggs can transmit this disease.

Brucellosis results in an acute syndrome consisting of weakness, chills, malaise, headache and joint pain and a chronic picture of malaise, headache, sweating, vague pains and insomnia. Abscesses may develop in the liver, spleen, bone marrow, testes, ovary, kidney and brain. It is a common cause of abortion in cattle and premature delivery in goats and sows. The disease can be transmitted to humans either through ingestion or handling of infected milk, dairy products or meat, and handling aborted tissues.

Tuleremia consists of headache, chills, vomiting, aching, pains and fever. Enlarged glands and ulcerated infections can occur. This results in a debilitating disease in sheep. Rabbits and hares behave oddly, run slowly and appear to be tame. Tick bites or direct contact with infected animals as well as handling rabid carcasses and drinking infected water transmits this disease.

Q fever consists of severe headache, malaise, muscular pain and loss of appetite. Patchy infiltration of the lungs can occur. This occurs from direct or indirect contact with infected animals, wool, birth fluids, feces, urine, and drinking unpasteurized milk. Also, the agent can survive a drying process which leads to dust inhalation and infection.

Ornithosis consists of headache, chills, fever, anorexia, sore throat, nausea and vomitting which may progress to severe lung disease and respiratory failure. Contact with duck and turkey infected feces, feathers, aerosols during removal of bowel and entrails can result in this disease.

Toxoplasmosis results in fairly mild symptoms or perinatal infection and abortion, brain calcification, fever, jaundice and convulsions. Exposure to calf feces and eating infected under-cooked meat may result in this disease. Anorexia, lethargy, high fever and death in cats, birds and other animals can be observed.

Fungal diseases such as blastomycosis result in lesions of the skin and lungs and severe infections of kidney, liver and spleen. This results from inhaling soil fungii of plowed soil. Similarly, histoplasmosis in a severe form results in fever, anaemia, enlargement of spleen and liver, ulcers of the gastrointestinal tract and a pulmonary disease resembling tuberculosis. Aerosols from abandoned chicken coops as well as inhaled soil fungii can cause the disease.

Pssitiacosis results in a cough, fever, severe headaches, chills, chest and back ache, and vomiting all may be asymptomatic. It may pose severe complications for pregnant women. Exposure to poultry and sheep directly or through dried saliva or fecal aerosol, birth fluids or a bite of a bird may result in this disease.

Most of these diseases are reportable in the Province of Ontario and as long as the reporting system is adequate, the Ministry of Health will continue to be capable of monitoring the trends of these types of diseases across various regions in Ontario. Close cooperation must be maintained between farm workers, farmers, veterinarians and public health personnel to maintain adequate surveillance of these types of diseases. The effective elimination or treatment of infected animals is paramount to prevention of further cases or outbreaks of these diseases. The current public health system is well suited to maintaining surveilllance of infectious diseases among farm workers and further worker education will enhance the reporting of these diseases. Family physicians may regard some of these as exotic diseases, however, many may easily misdiagnose them as common colds and flus. Specific diagnostic tests through the public health laboratories can more definitively establish the diagnosis and are readily accessible through the public health system. Education of family physicians again is paramount to enhancing the recognition of infectious diseases related to farm work.

Problem 7 - Noise-Induced Hearing Loss

The investigation of exposure to noise from agriculture equipment began by the group in Nebraska by Lierle (1959). The increasing mechanization of farm work including the increase of time of riding tractors has led to a general increase in the exposure time experienced by farmers to noise.

The effect of noise on the human body has been well investigated. There is a gradual decline in hearing sensitivity and this can be measured by serial audiometry. An increase in hearing thresholds across the high frequencies maximum at the three and four thousand cycles per second is observed. The symptoms of hearing loss include increasing difficulty in communication, tinnitus or ringing in the ears, difficulty with understanding speech especially in noisy environments, increasing irritability, headaches, and possibly psychological disorders. Increasing deafness may also be related to an increased risk of accidents as the detection of warning signals or malfunctioning machines may be impaired.

The site of damage to the hearing mechanism is at the cochlea, the delicate end organ mechanism deep in the temporal bone. Hair cells are disrupted and bent irreversibly, like wheat being blown on the prairies. The permanent effects of noise are often subtle and are not recognized initially by the workers themselves. Often the problem is identified by family members who become frustrated with their inability to communicate effectively with the person. The problem of tinnitus is problematic as very little medical therapy can alleviate the problem and results in a continuous irritation to the individual. Noise-induced hearing loss is an irreversible problem form which rehabilitation is only moderately successful in treating. Hearing aids are often not effective in regaining communication abilities, and even after much expense to the individual, they are not used to their optimum capabilities.

The extent of the problem of hearing loss among farmers has been explored by a number of investigators including Thelin (1983), Sullivan (1981), McCarthy (1981). All of these studies point to the noise sources as being machines that are becoming larger and more powerful, as the size of farms increase and the demand for mass crop production rises. The measurement of sound, for example, from tractor noises is easily carried out by dosimeters that are readily available. The measurement of impact noise is somewhat more difficult and requires more sophisticated instrumentation.

The possibility for preventing noise-induced hearing loss consists of primarily engineering controls by quieting the noise source from the diesel motors, enclosure of the farm worker by providing a cab on the tractor which can often be combined with air conditioning, and less preferably the use of personal protective devices such as ear plugs and ear muffs. The reason that these latter strategies are less effective is that compliance rates among workers are usually very low because of the discomfort of wearing them for many hours, up to 16 hours during peak harvest season. Exposure limits should be restricted to 85 dB or less as this is at the level that is generally accepted that noise-induced hearing loss can be caused over a normal 40 hour working week and 40 year work career period. Current legislation in Ontario rests at 90 dB for 8 hours per day and engineering controls may be instituted only where feasible.

There does not exist in the published literature a comprehensive survey of noise-induced hearing loss amongst agricultural workers in Ontario. This needs to be done to measure the extent of the problem and investigate efficient methods of controlling and preventing the effects of noise. Noise is soon to be a designated substance in the Province of Ontario and it will be important that agriculture workers are included in this legislation. There are many sources of types of noise which should be assessed, not only that of mechanized equipment. For example, in the study of O'Blenis (1984) the noise exposure from pigs in confinement buildings was exceedingly high and posed a risk to pig farmers. In this stiuation engineering controls may not be feasible and stress on the compliance with the use of hearing protective devices must be made to those workers exposed. Even with optimum usage, the attenuation afforded by these devices often amounts to only 10 to 15 decibels over an extended period of wearing them and depending on the type and level of the noise exposure, this may not be sufficient to prevent some damage to the sensitive hearing apparatus. The effects of noise on the farming population may in fact, be a larger problem than one would expect. This clearly is a high research priority for Ontario to further understand the extent and distribution of noise problems in this working sector and that preventive measures can be taken once the problem is clearly recognized. The noise regulations, if applied to farm workers, could prevent many cases of this irreversible and isolating condition.

Problem 8 - Musculo Skeletai Diseases

Musculo skeletal diseases among farm workers included the major problem of low back pain as well as problems related to repetitive motion and adverse ergonomic conditions.

The problem of low back pain in industry is widespread and it is to be expected that this condition among farmers is a major problem. A number of ergonomic assessments have been carried out, notably by Sjoflot (1984) and Matthews (1983). The crucial factors related to mechanized equipment are the quality of the seating for the operator of the machine and the minimization of exposure to whole-body vibration. There is increasing evidence that exposure to this type of low-dose cumulative trauma can result in long-term effects on the discs of the spine resulting in degeneration and possibly herniation. Also strenuous work involving types of manual labour such as picking and lifting objects are common among farmers and often result in repeated temporary disability from strains and muscle spasms.

Sepplainen (1977) reported a peroneal nerve palsy from strawberry picking. These types of problems can be expected in Ontario, especially in harvest season where there is a major incentive to work long hours at a very rapid pace. The only treatment for these types of diseases is that of rest, however, usually under the pressures of harvesting the common musculo-skeletal problems are dismissed for economic reasons.

Prevention of vibration-induced disease, either to the whole body or to the extremeties such as the feet and hands, can be resolved by engineering controls and ergonomic solutions. Avoidance of awkward designs for tractors and other machinery should be considered carefully at the engineering stage. The natural history of musculo-skeletal disease is one of long-term disability that has been well recognized among farm workers in general, but not well measured in any large scale epidemiological study in Ontario.

Problem 9 - Accidents

Farming is well known to be a dangerous occupation. As mentioned previously, the character and the pace of farming in Ontario has changed dramatically in the past 20 years with the heavy mechanization and enlargement of the farming operations. A key study of farm accidents was done by Baker (1981) who reviewed the extent, scope and severity of accidents and injuries in Ontario. Although the hazards and dangers of farming have been long recognized, little research into the determinants and consequences of farm accidents have actually taken place. It has been implied that farmers are accident prone by various governments and accident prevention associations in the province, however, the evidence in the little research that has been done demonstrates that this is not the case. There appears to be a strong inverse relationship between the length of farming experience and the involvement in accident and injury. The relationship to the tractor is central to the causation of many farm accidents. Other machines such as the grain auger have been singled out as a very dangerous machine.

The Workers' Compensation Board in Ontario reports that in 1983 there were 2,812 injuries to paid employees on 25,533 farms; roughly one injury for every 9 participating farms. The weighted average claim was $3,352, which represents a total outlay of 9.4 million dollars to these workers. There is no available data to estimate the amount of lost time experienced by the larger number of employer or self-accounting farmers or their families.

A number of issues are clear after reviewing this information. The tractor is the main agent of death and severe disability on Ontario farms. Mandatory installation of rollover protection devices on both new and old tractors would greatly reduce the number of fatalities. These devices are now mandatory in many European countries. Mandatory shielding of power take-off units and of machinery such as the auger would greatly reduce the number and severity of injuries that these instruments are capable of producing. Inexperience and immaturity are a factor in accident etiology. Educational programs such as those promoted by the Farm Safety Association, although impossible to evaluate objectively, can only be encouraged in the strongest possible terms.

Accidents to children are occurring at an alarming rate. These children are often operating dangerous machinery or vehicles. Legislation governing the age of persons that may operate these types of machines should be brought into effect. The overall burden of non-fatal injuries on Ontario farms is impossible to assess given the information accrued. Every year there is possibly one accident for every 5 to 7 farms. If more accurate data is desired, then a comprehensive cohort study across the province would be required.

Problem 10 - Stress

The problem of stress and farm work has become a matter of increasing concern in recent years. Financial concerns and difficulties, lack of leisure time, lack of money for a holiday, and family responsibilities conflicting with farm expenditures were all related to increasing stress especially among women farm workers. The women on the farm bear the burden of a number of different roles including family responsibilities as well as being responsible for financial decisions. The financial burdens therefore, would rest on the woman in the family and results in the bind of denying family members items that would normally be granted.

Mental fatigue and frustration were common symptoms as well as irritability. In more extremes sleeplessness and frank depression was encountered. Ireland (1981 and 1983) has described these factors involved in stress among farm workers very clearly in her research. In contrast Pfeiffer (1984) only surveyed aspects of lifestyle fitness among Ontario dairy farmers. From a number of variables the farmers enjoyed a number of health advantages over their urban peers. This clearly reflects the vigorous nature of farm work especially among males. The toll of stress however, is not seen in the type of measurements which can be done through anthropometric, physiological and psychosensory variables. The measurement of stress is difficult and must rely on the reports of psychological well being from the individuals concerned.

This is contrasted by a number of studies which look at the prevalence of psychiatric disease and symptoms amongst farm workers. This gives a different picture to the nature of stress-related disorders and also may be implicated in elevated rates of ischemic heart disease, even though more rigorous and nonanalytic studies have not been carried out. Other factors such as alcohol and drug abuse may be important as correlates of stress related problems.

The financial plight of the farm worker and farmer has been described in other documentation and will not be reviewed here. Clearly this is a major source of difficulty in this group and must be considered in any program to reduce the amount of stress-related problems.

APPENDIX 4

JOINT BRIEF

to

THE MINISTER OF LABOUR

regarding

OCCUPATIONAL HEALTH AND SAFETY

by the

Ontario Federation of Agriculture

Ontario Farm Safety Association

Ontario Fruit and Vegetable Growers' Association

August, 1977

It is a pleasure to present this brief on behalf of agriculture in Ontario. We congratulate the Minister on her persistent, enquiring approach to develop operative Occupational Health and Safety Legislation in Ontario.

Three organizations, the Ontario Farm Safety Association, the Ontario Fruit and Vegetable Growers' Association and the Ontario Federation of Agriculture have prepared the following statement on behalf of Ontario farmers.

The Farm Safety Association represents 23,000 farmers reporting to the Workmen's Compensation Board. The Ontario Fruit and Vegetable Growers' Association represents all of Ontario's 14,000 fruit and vegetable growers.

The Ontario Federation of Agriculture represents 23,000 individual farmer members and through the Commodity Boards and Associations, the producers of most agricultural products grown in Ontario.

We will attempt to keep the following statement as brief as possible and would welcome any questions on any of the points raised.

Because of the complexity of the workplace, weather conditions, seasonal nature of agricultural work, long extended hours during peak periods, machinery and equipment designed and manufactured to different standards for agriculture than for the same equipment used in industry and the fluctuating number of workers involved with the inherent job training problems, agriculture requires special consideration in the development of Occupational Health and Safety Legislation.

The development of such legislation must be by consultation with farmers and farm organizations. Farm organizations will, therefore, support the extension of health and safety legislation to agriculture provided that it is developed by the Ministry of Labour in consultation with an Agricultural Advisory Committee.

We propose that an Advisory Committee composed of one representative and one alternate from OFSA, OF&VGA, OFA, OMAF and WCB be accepted by the Minister to assist in the development of regulations for agriculture. Further, this advisory committee would assist in developing an arbitration system, whether it be by joint health and safety committees or otherwise. We insist that there be an Agricultural Advisory Committee. This Committee proposes the following:

1. We support the intent and realize the need for Occupational Health and Safety regulations in agriculture. Whether such legislation should be extended to other workers should be a matter for consultation between the Ministry of Labour and the group concerned.

2. (A) The legislation should make provisions for standards of safety by regulation. No part of the Omnibus Bill should apply to agriculture except by regulation. Since each segment of agriculture requires particular knowledge and skills and work is performed under a wide range of environmental conditions, unsafe conditions in agriculture should be covered by separate regulations (see section 6). Unsafe conditions rather than unsafe work should be described. There must be provisions made for exemptions where standards for machines would make the machine impractical or inoperative, e.g., ROPS on tractors used in orchard work. An appeal procedure would be developed by the Advisory Committee in conjunction with your Ministry to hear appeals from both employers and employees as to employees' refusal to perform work under unsafe conditions.

   (B) Protection for the employer against the frivolous or unjustified resort to the right to refuse to work should be established by regulation. Protection for an employee who is unjustifiably disciplined for refusing to perform work under unsafe conditions should be provided by regulation.

   (C) The employer should have the right under conditions established by regulation to provide alternative assignments and/or temporary lay-off. The employer should have the right to assign the disputed work to another employee until the Agricultural Health and Safety Appeal Committee have resolved the dispute. The objecting employee should have right to full remuneration preceding resolution of the dispute provided that he is willing to perform alternative work during the dispute and providing there is work available.

3. The whole concept of joint Health and Safety Committees and the designation of health and safety representatives, is based on organizational and social structures existing in industry and does not take into account the organizational and social structures existing in agriculture. There is, however, a need for arbitration, investigation and expert information. The establishing of a body to carry out these functions should not be at Ministerial discretion. The development of the artibration system should be by the Minister in close consultation with the joint Advisory Committee mentioned above.

4. Few if any chemicals are used by agriculture other than pest control products. The control of such products and their use is regulated by the Pesticides Act - Ontario 1973, and the Pest Control Products Act - Canada, therefore further regulation is not required at this time. If, however, standards are required in the future, they should be guidelines recommended by the Advisory Health and Safety Committee as indicated by records and experience for the protection of health and safety.

5. The Advisory Council on Occupational Health and Occupational Safety should study, research and advise the Minister on matters of occupational health and safety. Such a body should have funds available for research projects which may be contracted for with private agencies or universities. Such an advisory body should be composed of at least one representative of farmers, with the support of the Advisory Committee. The Advisory Council should be a research and advisory body for the Ministry and through the Ministry to any arbitration system established.

We remind the Honourable Minister that the three organizations represented by this committee have each nominated by separate letter, Mr. Peter Fisher to be farmers' representative to the Advisory Council on Occupational Health and Safety.

6. Farm organizations choose not to comment on existing regulations under the Industrial Safety Act, the Construction Safety Act and Mining Act. Any Omnibus Bill should contain provisions for similar requirements to cover agriculture by regulation. Such regulations should be approached from the point of view of ease of implementation, simplicity of explanation and enforcement so that the desired objective of overcoming unsafe and unhealthy conditions will be achieved. Separate regulations dealing with unsafe conditions rather than unsafe work should be drafted. Initial regulations should cover:

   (1) Protective structures for tractor operations.

   (2) Guarding and shielding of farm equipment.

   (3) Personal protective equipment.

It is imperative that when regulations are in place, any established standards must apply to new equipment only. Exemptions must be established for existing equipment on farms as well as for new equipment when standards for such new equipment would impede or prevent its operation.

Agriculture should be brought under the Health and Safety Act by regulation and by section as above. Each section should be considered separate from the others and regulations appropriate for one section prepared and introduced before attempting to bring other sections under the Act.

7. Since there are few precedents where health and safety legislation applies to agriculture and since many of the work conditions in agriculture are beyond the control of either the employer or the employee, contraventions must be dealt with in a manner consistent with responsibility. Existing provisions with respect to prosecution and remedies upon conviction are not appropriate to agriculture. The farm organizations recommend a careful study of conditions followed by development of regulations by the Advisory Committee and provisions appropriate for contravention of the regulations be established. There should be a distinction made

between regular work and emergency work. In event of emergency, it may be in the public interest to waive conditions.

8. Compilation of data relating to health and safety in agriculture should be the responsibility of the Workmen's Compensation Board, the Ontario Farm Safety Association and the Agricultural section of the Advisory Council on Occupational Health and Safety. Analysis of data should be the responsibility of the Health and Safety Advisory Council. Dissemination of information to employers, employees, farm organizations, associations and others, should be the responsibility of the Minister of Labour who may use the Advisory Council and the Ontario Farm Safety Association as the disseminating bodies. Accident Prevention Associations should continue to promote safety and accident prevention.

9. Bill 139, the Employees' Health and Safety Act, does not apply to agriculture. However, the provisions in this bill as they now exist are unworkable in agriculture because of the diversity of work places and conditions beyond the control of any person or groups of persons.

10. To provide for agriculture to be included in any future Health and Safety legislation, by regulation, the definition section of Bill 139 should be amended to include the following definitions:

Occupation - means any employment, business, calling, or pursuit designated by the regulations as an occupation.

Worker - means any person engaged in an occupation.

Workplace - means any premises or location, whether indoors or outdoors, where a worker is engaged in any occupation.

SUMMARY

The OFSA, OF&VGA and OFA compliment the Minister for the approach taken to develop the Omnibus Bill. Effective legislation is developed when the legislators provide for open consultation with the parties to be affected by the proposed legislation. Your series of meetings held earlier this year are an excellent example of such action. We must, however, object to the limited time allowed to prepare an in-depth study of the application of health and safety legislation to agriculture. Our response to your very specific questions have, therefore, been approached in a very general way. We have taken this approach because we do not wish to unduly delay the introduction of the Omnibus Bill and the application of health and safety legislation to other segments of society. The farm organizations support the application of health and safety regulations to agriculture but only after careful study of the effect of such regulations on each segment of agriculture. Such regulations must be introduced over a period of time and under close consultation with the Farm Safety Association, OF&VGA and OFA.

APPENDIX 5

HAZARDOUSNESS RATINGS OF FARM EQUIPMENT

extract from

THE TASK FORCE'S BACKGROUND PAPER #2
FARM MACHINERY INDUSTRY AND FARM SAFETY

prepared for

THE ONTARIO TASK FORCE ON HEALTH AND SAFETY
IN AGRICULTURE

by

The Ontario Centre for
Farm Machinery and Food Processing Technology
Chatham, Ontario

HAZARDOUSNESS RATINGS OF FARM EQUIPMENT

Farm machinery is operated and maintained by farmers and farm employees in various specialized applications within the agricultural industry. As outlined in the terms of reference in Chapter One, an attempt has been made to present a qualitative and impressionistic safety hazardousness rating, and to identify the hazards of the various pieces of farm equipment. The ratings have been assigned from the equipment design, configuration and construction point of view, as opposed to the experience and use point of view. The purpose of these ratings is to help identify those types of machines and types of farming that are most dangerous or hazardous, due to the complexities or other characteristics of the machinery used. The ratings also cover the service and maintenance characteristics of the machines.

Farm Machinery Used in Tillage, Planting, Fertilizing and Harvesting Crops

Types of Farming Disciplines

To cover the farm machinery used in working and fertilizing the soil, planting, cultivating and harvesting crops, three basic categories have been used:

1) Cash crop farming (grains).

2) Fruit and vegetable farming.

3) Tobacco farming.

Common Denominator Equipment

The equipment listed below is common to the three disciplines of farming mentioned above. These machines are used in varying sizes and configurations for each of the specialized operations.

1. Tractors
2. Ploughs.
3. Discs

4. Cultivators
5. Harrows
6. Planters
7. Wagons
8. Sprayers

Hazard Ratings

A hazard rating on a scale of 0-10 is used, with 10 being the maximum hazard. It does not mean that a "0" rated machine is perfect and that a "10" rated machine is too hazardous to use. The main factors considered in the hazard rating are:

1. Machine Complexity:

   - number of parts
   - number of moving parts
   - speed of moving parts
   - likelihood of needing a great deal of adjustment
   - exposure to danger while servicing because of the complexity of the machine
   - pinch points related to motion, mechanisms and machine function
   - need for certain skills and training in order to operate safely and satisfactorily
   - need for certain skills to maintain and service the machine
   - location of energizing stop levers, or buttons.

2. Size, physical configuration, mobility, centre of gravity and the effect of:

   - speed of operating the machine
   - transportation speed
   - visibility of operating parts at the front and rear of machine
   - visibility of other operators on the machine
   - noise level around the machine
   - provision of controls and their location on the machine
   - self-propelled or towed machine
   - shifting load such as liquids
   - presence of exposed sharp edges and cutting or shearing sections
   - presence of man size openings.

3. Service and Maintenance

- likelihood of service error
- danger in making adjustments i.e. whether the machine has to shut-off for adjustments
- frequency of adjustments required e.g. a combine has more adjustments when compared to a cultivator
- frequency of service and lubrication and location of service parts on the machine.

4. The ability of the operator to make the machine hazardous through

- neglect and misuse
- ease of removal of guards
- presence of interlocking guards
- no guards at all because of the operating characteristics of the machine
- provision of tie downs, or clamping devices.

The following is a list of various implements and machines used by the three disciplines of farming with an empirical, qualitative, and impressionistic hazard rating and a brief comment on the type of potential hazard. It may be noted that this is based on the collective judgement of experienced, and presumably unbiased, individuals at the Ontario Centre for Farm Machinery and Food Processing Technology. The hazard ratings of the machines are based on the machine and machine design factors as described only; they are not based on the operator's point of view nor on the physical and mental condition of the operator.

Cash Crop (grains)

Tractors - (field) Hazard Rating - 4

Likely hazards relating to tractors include those related to tractor upsets, crushing and pinching accidents during hitching operations and getting entangled in p.t.o. shafts. The height of the centre of gravity and the lateral stability of the tractor influence the ease with which a tractor will upset in a hazardous situation. Hitching an implement above normal drawbar height can cause a tractor to overturn backwards. Although many of the new larger tractors have cabs, most tractors do not have roll over protective structures to protect the operator when a tractor overturns. On many tractors, the operator appears to be insufficiently shielded from the rear tires.

Subsoilers **Hazard Rating - 2**

The greatest hazard imposed by the machine is its weight. Like most tillage machinery, the subsoiler is often serviced in the raised position. Improper blocking or jacking of the machine, can result in having the implement or one of its components fall, which creates a hazard to the person servicing the equipment.

Ploughs **Hazard Rating - 3**

The hazard which was described for the subsoiler also exists with this machine. The exposed sharp edges of the cutting coulters creater another potential hazard on the plough.

Discs **Hazard Rating - 4**

Disc harrows are bulky and have exposed sharp edges. The latest disc harrows are larger in size, requiring complicated folding arrangements. The probability of these folded sections falling is minimal, but must be considered a safety hazard. These sections, when raised in a vertical position, can also hit low obstacles such as tree branches or telephone lines, or people.

Harrows **Hazard Rating - 3**

Harrows have many sharp points and are generally awkward to manoeuvre because of their large size.

Cultivators - Field **Hazard Rating - 4**

The newer models are quite large and heavy and require the operator to climb in among the machine components when servicing or adjusting the machine. Many of the field cultivators are folding models.

Cultivators - Row Crop — Hazard Rating - 4

The row crop cultivator has a large number of cultivator sweeps or points, which have exposed sharp edges, and are noted especially during the adjustment, maintenance and servicing of the machine.

Packers - Crumblers — Hazard Rating - 2

Some of the newer models have folding arrangements.

Planters - Corn, Beans — Hazard Rating - 4

Planters have a number of rotating and moving parts, which result in pinch points, shear points and wrap points. The planting operation requires the operator to be near the machine often, which increases the potential for injury. On many planters, the operator must climb on to a tool bar or hitch to fill the fertilizer applicators.

Grain Drills — Hazard Rating - 3

Grain drills do not have as many moving parts as planters, but the operator is subjected to the same types of hazards.

Combines — Hazard Rating - 9

A combine is a large, noisy piece of machinery with a great number of moving parts that are exposed and have sharp edges. These machines occasionally plug up, which requires the operator to place himself in vulnerable positions. There are man-size openings in combines.

The operator's visibility is very limited when driving a combine, which makes it difficult to manoeuvre around obstacles safely. They are steered by their rear wheels, making the control of the combine more difficult when travelling at road speeds.

Corn Pickers Hazard Rating - 8

The corn picker is a slightly smaller machine compared to the combine, but is just as complicated. It has a larger number of moving parts, pinch points, and pull-in points. Corn pickers also tend to get plugged at times.

Wagons Hazard Rating - 2

Wagons greatly obstruct the rear view of the tractor operator. Road travel is dangerous for the tractor operator, as well as all other vehicle passengers because of this lack of visibility. Tall loads travelling at excessive speeds can upset easily.

Climbing into a gravity wagon can be dangerous, because the surface on which the person must stand is usually quite slippery, as well as steeply sloped.

Water Tanks on Wagons Hazard Rating - 3

A tank full of water travelling at road speeds carries a great deal of momentum and is subject to sudden load shifts. This makes sudden stops or turns at excessive speeds very dangerous.

Stone Windrower Hazard Rating - 4

This machine is made of components which are quite heavy. This makes the servicing of this machine hazardous.

Stone Pickers Hazard Rating - 4

Same as stone windrowers.

Manure Spreaders Hazard Rating - 6

These machines have rotating sharp edges. These rotating parts result in pull-in points or wrap points.

Liquid Manure Spreaders — **Hazard Rating - 4**

These are usually bulky tanks without baffles to stop the shifting of the load, especially when the tank is partially full.

Agitators — **Hazard Rating - 4**

This unit is generally positioned on the edge of the tank or manure pit and is powered by a p.t.o. shaft. Sometimes the adjustments have to be made while standing in a precarious position.

Generators — **Hazard Rating - 4**

Normally driven with a p.t.o. shaft from a tractor, which is exposed. Possibility of electric shock from wires.

Pumps — **Hazard Rating - 2**

Possibility of leaks and liquids could be under high pressure.

Scraper Blade — **Hazard Rating - 2**

The scraper blade is quite heavy and has a sharp lower edge.

Fruit and Vegetable Crops

Tractors - (orchard) — **Hazard Rating - 7**

In an orchard, a tractor operator is subjected to many overhead obstacles, but most tractors are not equipped to offer overhead protection to the operator.

Wagons — **Hazard Rating - 2**

Wagons obstruct the rear vision of the tractor operator.

Harvestors Hazard Rating - 8

The harvestors are generally bulky, noisy and allow limited visibility for the operator. They have a large number of moving parts, which mesh into pinch points, shear points and pull-in points. On many harvesters, personnel are required to be in close proximity to some of these moving parts.

Picking Aids Hazard Rating - 4

Picking aids are basically frames that carry personnel, and often offer very few restraining devices for the riders.

Cultivators Hazard Rating - 4

Same as Cultivators, p. 59.

Discs Hazard Rating - 4

Same as Discs, p. 59.

Planters - Transplanters Hazard Rating - 5

Transplanters have a number of pinch points and exposed chains. There are always persons near these moving parts, which enhance the odds for injury.

Bedders - ridgers Hazard Rating - 3

Same as Ploughs, p. 59.

Mowers Hazard Rating - 8

The mowers have high speed rotating blades, which has the potential of injuring a person, either by coming in contact with that person or by propelling objects at him or her.

Post-hole Diggers Hazard Rating - 8

Post-hole diggers have the p.t.o. and the auger exposed.

Irrigators

Hazard Rating - 2

Irrigators have a few moving parts and pinch points. Some of them have the p.t.o. exposed.

Fork lifts

Hazard Rating - 4

The fork lift driver's vision is often obstructed by the load being transported. Load stability as well as vehicle lateral stability are potential hazards of this machine. Loads carried at elevated positions raise the fork lift's centre of gravity and increase the likelihood of vehicle upsets.

Front End Loaders

Hazard Rating - 5

Carrying loads with the bucket in an extended position can reduce the stability of the tractor. The tractor operator's vision can be obstructed by the loader bucket.

Toppers

Hazard Rating - 8

Toppers have pinch points and exposed sharp edges that are rotating rapidly.

Corn Detasselrs

Hazard Rating - 8

The hazards described for toppers also apply to corn detasselers. This machine has a very high centre of gravity which reduces its stability. The danger which results from this lack of stability is magnified at road speeds.

Crop Thinners

Hazard Rating - 3

Crop thinners have sharp cutting edges.

Land Levellers

Hazard Rating - 3

This is a very large and heavy piece of machinery. Injuries caused by these machines are most likely to occur when the machine is being serviced.

Chain Saws — Hazard Rating - 8

Chain saws have exposed sharp edges that are moving at extremely high velocities. Wood debris projected from the saw blade is another hazard for the operator.

Tobacco

Tractors - field — Hazard Rating - 4

Same as Tractors, p. 58.

Discs — Hazard Rating - 4

Same as Discs, p. 59.

Cultivators — Hazard Rating - 4

Same as Cultivators, p. 59.

Ridgers — Hazard Rating - 3

Same as Ploughs, p. 59.

Transplanters — Hazard Rating - 5

Same as Transplanters, p. 63.

Plant Pullers — Hazard Rating - 4

Plant pullers have a number of moving belts and chains resulting in several pinch points.

Tobacco Harvesters - Manual — Hazard Rating - 5

These are self-propelled machines that have a number of exposed moving parts and pinch points. The load is generally carried on top of the machine above the top leaves.

Tobacco Harvester - Automatic Hazard Rating - 9

The safety hazards associated with this machine are similar to those described for the combine.

Trailers Hazard Rating - 3

The heavy bins carried on these trailers are dumped out on one side of the trailer. During this procedure, the loads are shifted in one direction, causing a stability problem.

Bin Lifters Hazard Rating - 4

The heavy load is capable of swinging, which can lead to hazardous situations. There are a number of moving linkages on bin lifters which create pinch points.

Stalk Choppers Hazard Rating - 6

Stalk choppers have rotating sharp edges which are exposed. Projectiles thrown by these machines can also be hazardous to bystanders.

Toppers Hazard Rating - 8

Sharp knife edges are rotating at high speeds on toppers. Objects can be propelled from the unit at very high velocities.

Irrigators Hazard Rating - 2

Same as Irrigators, p. 64.

Deluggers Hazard Rating - 4

Deluggers have rotating parts which create pinch points and shear points.

Rack Loaders Hazard Rating - 5

This machine has a number of pinch points. It runs on 110V.

Steamer Humidifiers **Hazard Rating - 9**

Steamer humidifiers have high temperature surfaces and are subject to leakage.

Kilns **Hazard Rating - 3**

Among the components which could potentially be hazardous are the blowers and the heat exchangers.

Strippers **Hazard Rating - 4**

These machines have chains and sprockets which mesh into pinching points.

Water Tanks on Wagons **Hazard Rating - 3**

Same as Water Tanks on Wagons, p. 61.

Farm Machinery Used to Handle and Apply Chemicals

Current day efficient crop production systems require effective weed, insect, disease and bacterial control. This is achieved by the used of chemical, biological and mechanical methods. Chemical application machinery such as sprayers, granular applicators, and dusters have been rated for their hazardousness as follows. The hazards have been identified by considering such factors as machinery size, configuration, complexity, operating adjustments, service and maintenance.

Most chemicals are applied by use of liquid carriers under pressure and metered through a nozzle. Some of it is applied in granular form which is either broadcast or banded. There are some chemicals applied in the form of dust. The functions of chemical application equipment are to store, meter, atomize and distribute the chemical accurately to control the target diseases, pests, insects, and weeds.

Chemical fertilizers are also applied with the use of the above mentioned machinery in liquid, granular, and anhydrous forms.

Sprayers

Boom Type Skid Mounted — Hazard Rating - 4

The access to the tank opening is cumbersome.

Boom Type Tractor Mounted — Hazard Rating - 5

The p.t.o. is usually exposed and there exists the possibility of splashing from the lids. Access to the tank for filling the chemical may be cumbersome, and there is no drift control.

Boom Type Trailer Mounted — Hazard Rating - 6

Hazards are similar to those mentioned for the tractor mounted sprayers.

Boom Type High Clearance — Hazard Rating - 6

Access to tank lid for filling chemicals, and the location of the driver's seat is usually high on the machine. There are drift problems. Some large machines can spread out to a width of fifty to sixty feet, making them vulnerable to obstacles.

Mist Type/Air Blast Sprayers — Hazard Rating - 6

The extremely fine state of the chemical mixture, and the direction in which is released, encourages drift. They have high speed fans and are operated under conditions of high pressure.

Boomless Type Sprayers, Cultivator/Disc Mounted — Hazard Rating - 4

Access to tank can be cumbersome.

Knapsack Sprayers — Hazard Rating - 2

There is a possible danger of spillage.

Granular Applicators

Broadcast Spinning Disc Type	Hazard Rating - 5
Pneumatic Applicators	Hazard Rating - 5

There are rotating and moving parts, and particles are propelled away from the granular applicators.

Anhydrous Ammonia Applicators	Hazard Rating - 10

The chemical is at high pressure in the tank. There is a possibility of leakage from lines and couplers.

Dusters	Hazard Rating - 4

The machine has rotating parts which are exposed.

Side Dress Applicators	Hazard Rating - 3

There are a number of pinch points and exposed chains.

Feed and Grain Handling Equipment on the Farm

Grain and feed are an integral part of most farm operations. Grain is either stored, transferred, processed or transported, or a combination thereof, on the farm. Another major component of feed is hay and silage, which is harvested, transported, stored and distributed on the farm. The machinery used to handle feed and grain can vary from very simple set-ups and configurations to those that are elaborate and make use of new technology. In an attempt to simplify the listing of the feed and grain handling equipment, it has been categorized as transporting, handling and processing equipment.

An analysis and commentary on the hazard rating is based on the design and function of the equipment, and is presented with ratings based on the criteria explained earlier.

Equipment for Transporting Feed and Grain

Farm Truck and Tractors — Hazard Rating - 4

The trucks are usually bulky and have restricted visibility at the rear, especially for backing up to load and unload. Tractor hazards are the same as those listed on Page 58.

Gravity Wagons — Hazard Rating - 2

These wagons have man size openings and no brakes.

Self-unloading Wagons/Forage Wagons — Hazard Rating - 8

These machines have man size openings with several pinch points and exposed beaters. They are bulky and can be tipped over when being transported through rough fields and farm lanes.

Bale Wagons — Hazard Rating - 5

They carry heavy, bulky loads making them cumbersome to manoeuvre in farm yards and laneways. Visibility is limited at the rear of the wagons when they are loaded.

Equipment for Handling Feed and Grain

Power Driven Augers — Hazard Rating - 8

These have high speed rotating sharp edges, and shafts. There is a possibility of objects being projected away from the machines on to bystanders or operators.

Blowers and Throwers — Hazard Rating - 10

Very high speed sharp edged moving parts, with man size openings for intakes create a hazard. Objects can be propelled away from these machines.

Chain and Belt Elevators Hazard Rating - 6

There are exposed moving parts with pinch points, which may be operating at relatively high speeds.

Silo Unloaders Hazard Rating - 9

The machine normally operates in a remote location from the power switch. Components run on high voltage. The auger and teeth are exposed. The unloader unit is usually suspended inside the silo during filling. Maintenance is cumbersome, especially when the unloader is located on top of the silo.

Rakes and Tedders Hazard Rating - 4

The p.t.o. shaft and sharp points are normally exposed on this machine.

Hay Balers Hazard Rating - 6

The pick-up unit is exposed with moving sharp points. Pinch points and parts moving relative to each other are exposed. The large round balers have man size openings for material inlet and an exposed p.t.o shaft.

Forage Harvesters Hazard Rating - 9

These are bulky machines, which in addition tow a forage wagon making the machine cumbersome and difficult to manoeuvre. Visibility is poor and sharp moving parts are present. The machine is quite complex with a number of parts that require regular maintenance.

Swathers Hazard Rating - 8

Sharp edges on the cutter bar and rotating parts are exposed.

Skid Loaders Hazard Rating - 6

There are a number of pinch points. Sometimes visibility can be a problem.

Wheelbarrows Hazard Rating - 1

The load is unstable in transport position with possibility of causing back injury.

Feed and Grain Processing Equipment

Driers Hazard Rating - 4

The burners, fans, and heat exchanger section are complicated, with proper operation dependent on a combination of parts working in the right sequence.

Feed Mixers Hazard Rating - 4

There are man-size openings with rotating intermeshing parts inside.

Rollers Hazard Rating - 4

Rollers operate at high speed creating a pull-in hazard.

Hay Processors Hazard Rating - 6

These machines have high speed rotating shafts with sharp edges and there is a possibility of objects being propelled away from the machine.

Feed Grinders Hazard Rating - 8

There are a number of high speed moving parts and objects can be propelled away from the machine. Sometimes driven by a p.t.o. shaft which may be exposed.

List of Machinery Categorized by Hazard Intensity	Hazard Rating
Anhydrous ammonia applicators	10
Blowers, throwers (silage and grain)	10
Silo unloaders	9

List of Machinery Categorized by Hazard Intensity (cont'd)	Hazard Rating
Combines (self propelled)	-
Combines (pull type)	9
Swathers	9
Harvesters, automatic tobacco	9
Steamer humidifiers	9
Harvesters, fruit and vegetable	8
Mowers	8
Forage wagons	8
Forage harvesters	8
Corn pickers	8
Grain augers (portable)	8
Post hole diggers (p.t.o. driven)	8
Toppers	8
Corn detasselers	8
Chain saws	8
Feed grinders	8
Mist type/air blast sprayers	7
Tractors (orchard)	7

List of Machinery Categorized by Hazard Intensity (cont'd)	Hazard Rating
Hay balers	6
Manure spreaders	6
Self unloading wagons	6
Chain and belt elevators	6
Skid loaders	6
Boom type trailer sprayers	6
Boom type high clearance sprayers	6
Stalk choppers	6
Front end loaders	5
Boom type tractor mounted sprayer	5
Granular fertilizer applicators (broadcast - spinning and pneumatic)	5
Bale wagons/handling equipment	5
Planter/transplanters	5
Manual harvesters - aid for harvesting tobacco and vegetable crops	5
Rack loaders (tobacco)	5
Tractors (field)	4
Cultivators (field and row crop)	4

List of Machinery Categorized by Hazard Intensity (cont'd)	Hazard Rating
Discs	4
Row crop planters	4
Rakes and tedders	4
Stone windrowers - pickers	4
Liquid manure spreaders	4
Feed mixers	4
Agitators	4
Feed rollers	4
Hay processors	4
Driers	4
Generators	4
Boomless type cultivator/disc mounted sprayers	4
Boom type skid mounted sprayers	4
Dusters	4
Picking aids	4
Fork lifts	4
Bin lifters	4
Plant pullers (tobacco)	4

List of Machinery Categorized by Hazard Intensity (cont'd)	Hazard Rating
Deluggers (tobacco)	4
Strippers (tobacco)	4
Seed drills	3
Ploughs	3
Livestock trailers	3
Bedders/ridgers	3
Land levellers	3
Water tanks on wagons	3
Crop thinner	3
Side dress applicators	3
Kiln	3
Harrows	3
Pumps	2
Gravity wagons	2
Sub soilers	2
Irrigators	2
Knapsack Sprayers	2
Packers	2

List of Machinery Categorized by Hazard Intensity (cont'd)	Hazard Rating
Scraper Blades	2
Wheelbarrows	1

APPENDIX 6

PATHWAYS OF PESTICIDE EXPOSURE

extract from

THE TASK FORCE'S BACKGROUND PAPER #3
AGRICULTURE CHEMICALS AND FARM HEALTH AND SAFETY

prepared for

THE ONTARIO TASK FORCE ON HEALTH AND SAFETY
IN AGRICULTURE

by

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Guelph, Ontario

PATHWAYS OF PESTICIDE EXPOSURE

All members of the farming community in Ontario including farmers, farm workers, farm families and bystanders may be exposed to the pesticides used in agriculture. In general, the hazard associated with the use of pesticides is dependent on the following factors: a) pesticide levels in the work environment; b) the amount of pesticide contacting the body; c) the amount of pesticide entering the body; and d) the metabolism and toxic action of the pesticide. The amount of pesticide which reaches the site of toxic action is a function of the first three factors. The effects of pesticide poisoning may be classified as acute, delayed, chronic or allergic. In acute poisoning, sudden distinct symptoms are seen shortly after absorption of large amounts of the chemical agent. Delayed poisoning may be of various degrees of severity and may occur after a short exposure followed by a latent period before symptoms appear.

Chronic poisoning may occur after repeated exposure and absorption of relatively small amounts of pesticide over an extended period. Very little confirmed information on chronic effects of pesticides on farm workers is available, however extrapolation from illness in pesticide manufacturing workers and from experimental animal studies suggests a potential for harm in some cases. Among the effects shown in animals treated for prolonged periods or at strategic times, but with relatively large doses of certain pesticides, are neurotoxic signs, reproductive effects, teratogenesis and organ pathology including carcinogenesis. In the following sections the toxicity and hazards associated with pesticides will be discussed in regard to pathways of exposure, routes of entry, toxicology of the pesticides and the incidence of pesticide poisoning.

Pathways of Pesticide Exposure

In this section the pathways of exposure are discussed in relation to the primary activities involved with pesticide use on the farm, i.e. transport, storage, mixing/loading and application (including worker re-entry and bystander exposure) and disposal.

Transport

Pesticides are usually transported to the farm in the rear of a truck or other farm vehicle. Small amounts of pesticide may be transported inside the passenger compartment. During transport, exposure of humans to the pesticide is unlikely unless the packaging material is damaged.

While the sale of agricultural pesticides in damaged containers is not legal, it may occur. The transport of leaking pesticide containers may result in exposure of the farmer to significant amounts of pesticide during transport, especially if personal protection equipment is not worn during loading or unloading of the vehicle.

Damage to packaging materials resulting in the leakage of pesticide may occur as a result of a vehicular accident during transport. Emergency response teams are available to deal with vehicular accidents resulting in large releases of toxic chemicals, e.g. the Transportation Emergency Assistance Plan under the direction of the Canadian Chemical Producers Association which coordinates agrochemical emergency response teams;

CANUTEC under the direction of Transport Canada; and the National Environmental Emergency Centre under the direction of Environment Canada. However, these teams are rarely involved with the relatively small-scale accidents that involve transport of pesticides to the farm. The disposal of damaged containers or the spillage of pesticide which may result from vehicular accidents is usually the responsibility of the farmer. The exposure of personnel to pesticides during the accident itself would be unlikely unless pesticides were being transported within the passenger compartment of the vehicle and the packaging material was damaged to such an extent as to cause leakage. If personal protection equipment (see mixing/loading for a detailed discussion of this equipment) is not used during the decontamination and cleanup following an accident, the farmer and other personnel at the accident site may be exposed to significant amounts of pesticides.

In relation to the total amount of pesticide transported by farmers, the above instances are believed to be rare and the exposure of farmers during transport to significant amounts of pesticide is unlikely to occur under normal conditions. The only information available on accidents during the transportation of pesticides is anecdotal and it is difficult to estimate the extent of the problem or the actual hazard involved.

Storage

Following transport to the farm, pesticides may be stored for periods of several weeks or months. In Ontario, the safe storage of pesticides on the farm is enforceable by law. Pesticides must, by regulation, be stored in areas where access is controlled at all times, the pesticide storage area must, by regulation, be vented to the outside, only pesticides and their adjuvants should be stored in the area, and a notice that the area is used for pesticide storage must, by regulation, be clearly visible on the outside of the storage area. These regulations require the storage of pesticides in locked rooms in farm buildings, or a separate locked storage shed. The storage of pesticides in secure areas reduces the possibility of theft, reduces the potential of contamination of feed and equipment, reduces the fire hazard, and minimizes the opportunity for exposure of unauthorized personnel to the pesticides.

Unfortunately, pesticides are not always stored in a secure area, or the area may be left unlocked and unattended during the mixing/loading and application operations. The security of the pesticide storage area is especially of concern in situations where significant numbers of people unfamiliar with farm operations visit the farm, e.g. pick-your-own operations. These farms are almost invariably associated with fruit or vegetable production in which significantly greater amounts of highly toxic pesticides are used. A similar situation occurs in ornamental production where the public may be allowed to select their plants directly from the greenhouses. In addition, farm laborers or visitors to farms may take pesticides from storage areas to control pest problems in their own gardens and homes without the knowledge of preharvest intervals, safety procedures, or proper application equipment. Children playing in the storage area may be exposed to dusts and spilt pesticides. As children see adults using the pesticides, they may mimic the actions of these adults, producing their own mixtures of pesticides, or playing with the pesticide concentrates. A related problem with regard to the poisoning of children is the storage of pesticides in other containers, especially those associated with foods, i.e. pesticide stored in beverage bottles. By law, pesticides cannot be stored in any other containers than those specifically designed for that purpose and, conversely, pesticide containers may not be used for the storage of other products.

Poorly vented pesticide storage areas may result in the exposure of farmers and farm labourers to significant amounts of dust and vapours containing pesticide. Thus, as required by law, pesticide storage areas must be well ventilated. Opened pesticide containers should be resealed as securely as possible and the storage area should be kept free of spilt pesticide.

In the event of a fire in the pesticide storage area, personnel involved in extinguishing the fire should not be exposed to the smoke and fumes produced. In addition, special precautions should be taken due to the flammable and explosive nature of some pesticides. This is the primary reason for the storage area being designated as such with a sign.

It is difficult to document hazards associated with storage of pesticides but the data presented in Tables 3-2 to 3-4 suggest that many cases of pesticide exposure and poisoning occur in young children. This is a clear indication of a lack of adequate control of pesticide storage but the data from Statistics Canada do not allow the identification of farm related pesticide poisonings from incidents in other environments.

Mixing, Loading and Application of Pesticides

The Mixing/Loading Site

The pesticide storage area may or may not be adjacent to the area where the pesticide is mixed and loaded into the application equipment. In the latter case, the pesticide should be transported to the mixing/loading location on a daily basis. This location may be in the field if the pesticide is applied in the form it is received, i.e. granular pesticides, or near a source of water if the pesticide is to be applied with a sprayer. As the mixing/loading area is usually not supervised when the application is being carried out, the temporary storage of pesticide in the field may provide access by children or other unauthorized personnel.

The mixing/loading site is often contaminated with pesticides. The concentrated pesticide may be spilt, or spillage may result from the overflow of unattended spray tanks as they are being filled with water. Rarely are materials maintained in the mixing area for the absorption of spills. Spilt material is usually left to soak into the ground, volatilize, or run off into ditches. Spillage at or near the head of wells may result in the contamination of wells used as a source of potable water on the farm. Similarly, potable water may be contaminated if the sprayer is filled using a pump that is not equipped with an anti-siphoning device which would prevent backflow of the spray mixture. The fact that the mixing/loading area is often contaminated with pesticides may provide a direct threat to personnel due to potential contamination of clothing, food, and beverages stored or consumed in the area. It may also result in long-term exposure of all farm personnel, including the farm family, to low concentrations of pesticides in potable water.

Mixing/Loading Personnel

The potential hazard of pesticides to those involved in the mixing/loading operation is well recognized. Usually the mixing/loading operation results in greater contact with pesticides than any other operation on the farm. During the mixing/loading operation, spillage of the pesticide concentrate may occur, and personnel may continually come into contact with dusts or vapours from the pesticide.

Pesticide formulations can be ranked from those which cause the greatest risk of contact during the mixing/loading operation to those with least risk as follows:

dusts
wettable powders
emulsifiable concentrates (high and low volatility)
granulars
soluble granules

The application of pesticides formulated and applied as dusts is rare in agricultural production, because of the mixing/loading and drift hazard. However, many pesticides are formulated as wettable powders which are almost impossible to open and load into the spray tank without contact by the mixer/loader. To a lesser extent, emulsifiable concentrate formulations with high volatility may result in contact with pesticide fumes. Some pesticides are formulated so as to reduce this volatility problem, e.g. phenoxy herbicides are available in low volatility ester and the less volatile salt formulations. These commonly used formulations, wettable powders and emulsifiable concentrates, often contain relatively high concentrations of active ingredients which further increases the risk associated with the mixing/loading of these materials. Granular formulations usually have lower concentrations of active ingredients and do not produce as much dust as wettable powders. A soluble granule formulation usually involves formulating wettable powders into small granules which dissolve upon contact with water. This method of formulation substantially reduces the amount of dust released during the mixing/loading operation.

Personal protection equipment which may be worn during mixing/loading and other operations to reduce the contact with pesticides are discussed below.

Gloves

Industrial rubber gloves made from natural rubber without a cloth lining or neoprene gloves should be worn when handling pesticides. However, rather than the proper type of gloves the farmer may use those which are normally available on the farm, i.e. cloth or leather gloves. These provide little, if any, protection. Gloves may not be of sufficient length to cover the forearms with the result that pesticide may run down the gloves onto the arm. Contaminated gloves may or may not be rinsed or washed after use resulting in contact when they are handled or re-used.

Often the greatest chance of direct contact with large amounts of pesticide during the mixing/loading operation is to the hands and forearms. The importance of wearing proper gloves to minimize this contact cannot be underestimated.

Respirators

Respirators are specifically worn to reduce the inhalation of dust and toxic substances. Not all respirators are suitable for protection against pesticides, e.g. dust masks only provide significant protection from dusts. Farmers should use respirators approved by NIOSH (National Institute For Occupational Safety and Health) for protection against agricultural pesticides. Cannisters on the respirators should be replaced regularly. In general, replacement is necessary after eight hours of use or if breathing becomes difficult or any pesticide odour is noticed.

Respirators should always be worn during the mixing/loading operation, however, respirators are uncomfortable items of equipment and therefore are seldom worn. This is especially true if the farmer has facial hair. A normal agricultural respirator will not seal properly to a face with a beard or side-burns. A farmer with a beard is forced to resort to a full-face respirator which is even more uncomfortable. Some farmers will use vaseline around the edge of the respirator to try and obtain a better seal.

Coveralls/Apron

The farmer rarely has a set of work clothes used only during the pesticide mixing procedure. Work clothes, including coveralls or aprons contaminated with pesticide dusts or spills, are often worn the entire day and may even be worn for a series of days without washing. These clothes are not only a source of exposure to the farmer and farm workers, but also result in the exposure of other family members. For example, children may play in areas where the clothes are stored (i.e. mud rooms), and thus be exposed, or laundering the clothes results in the exposure of those involved in the laundering process. Laundering may not remove all pesticides from clothing and the laundering of contaminated with non-contaminated clothing may result in pesticide residues in all of the clothing. Clothing which has been exposed to pesticides ideally should be changed or washed daily and always washed separately.

Eye Protection

Protection for the eyes is not usually worn, except by those farmers who normally wear safety eyeglasses. The eyes may be contaminated by spills, by dusts and vapours, and by the vigorous agitation in spray tanks and resultant splashing.

Boots

Normal work boots made of leather do not provide sufficient protection as they will absorb many pesticides. Rubber boots should be worn during mixing/loading or during the clean-up of any spilt pesticide.

Hats

A farmer rarely wears a hat specifically for protection against pesticide exposure during mixing/loading. Hats for protection against pesticide exposure are available, however, the only instances in which they are used to any extent is during the application of pesticides within structures or application with an airblast sprayer.

During the mixing/loading operation most of the contact dose would impinge upon the body through dermal contact and to a lesser extent by inhalation. The failure to wear protective clothing during the mixing/loading operation is probably the most common cause of pesticide poisoning in farmers. It should be appreciated that a farmer wearing a respirator, coveralls, neoprene or rubber gloves, rubber boots, and possibly a rubber apron is not comfortably dressed. This is especially true if weather conditions are hot and humidity is high. As a result, the personal protection equipment is often not used. Some personal protection equipment may actually result in pesticide spillage as it limits the freedom of movement of the farmer and may make pesticide containers difficult to handle. However, the importance of the personal protection equipment in the use of pesticides cannot be overemphasized. In some areas of the United States, closed-loading equipment and medical supervision for all mixer/loading personnel is required if they are working with pesticides of high toxicity for more than a specified number of hours per month. Closed-loading equipment is rarely used in Ontario and medical supervision is not required.

Application

The Applicator

Once the pesticide is ready to apply, i.e. in the spray tank or pesticide hopper, it is usually in a relatively dilute form. As a result, the pesticides are much less likely to result in acute toxic effects than during the previously discussed operations. However, some pesticides are sufficiently toxic to cause significant direct effects even in dilute form, (e.g. parathion). The use of ULV (Ultra Low Volume) equipment also results in the direct application of concentrated pesticide. Thus, there is the potential for direct toxic effects in the field.

In most pest control operations on the farm, the applicator is exposed to the second highest amount of pesticide, i.e. second to the mixer/loader. The actual amount of pesticide that the applicator may receive is dependent on the application equipment used, the weather conditions and equipment failure.

Commonly used application equipment can be ranked in terms of highest to lowest exposure of the applicator to pesticide as follows:

fumigant applications,
back-pack sprayers and hand applicators,
airblast sprayers, and
hydraulic boom sprayers (high and low pressure).

The applicator of fumigants within structures (greenhouses, storage areas) probably faces the greatest potential risk. No application equipment, as such, is used with these pesticides as they are usually only available to farmers in aerosols or smoke applicators. If an accident occurs during the set up of these fumigants and the applicator is not able to leave the treated building, significant toxic effects, possibly death, could result. Back-pack sprayers and hand applicators are heavy items of equipment when loaded, and may be difficult to hoist onto the back. During loading, hoisting onto the back and application, these sprayers often leak, resulting in pesticide coming into direct contact with the applicator. In addition, these pieces of equipment are often used inside structures (greenhouses, barns) where sprays may deflect onto the applicator, and the atmosphere contains pesticide droplets or fumes. Complete personal protection equipment should be used in these circumstances or exposure can be severe. Airblast sprayers are usually used in the application of pesticides in orchards or vineyards. These sprayers use high velocity air to carry pesticide into the foliage. Often the applicator is covered with spray mixture as it deflects off the foliage, or is blown back by wind. Complete personal protection equipment should be worn. The hydraulic boom sprayers are the most commonly used sprayers on most farm operations. While the applicator does not usually receive as great an exposure as with the other spray equipment, exposure still occurs.

Weather conditions for application with airblast or hydraulic boom sprayers that would minimize applicator exposure are low winds blowing across the field perpendicular to the direction of travel by the sprayer. If the farmer commences application at the downwind edge of the field and proceeds upwind, there will be minimal exposure due to passage through the spray cloud. This situation is relatively rare and farmers often have to drive through the spray cloud repeatedly during the application. During application, low temperatures are preferable to high temperatures as volatilization of the pesticide will be at a minimum and farmers are more likely to wear personal protection equipment.

The applicator may be directly exposed to the spray mixture in the field if there is equipment failure. High pressure lines containing the spray mixture may rupture or their couplings fail. As these lines and couplings are often located directly behind the applicator, this may result in the applicator being soaked by the spray mixture. A regular maintenance program for sprayers and the use of lower pressures would reduce the chance of this exposure. The clogging of nozzles of hydraulic boom sprayers is a common problem, especially if wettable powder formulations are in use. The farmer may remove the nozzle and attempt to clean it by using a readily obtained source of air pressure, the lungs. This requires the nozzle to be placed against the lips, with the potential of ingestion of the spray mixture. This source of exposure could be reduced if the use of wettable powder formulations was minimized, and if nozzle cleaning equipment was kept with the sprayer in the field.

During the application operation, the applicator may wish to eat, drink, smoke or attend to bodily functions. These actions may result in the ingestion of pesticide and/or the intimate contact of pesticide with the skin. Farmers usually wash their hands before most of these activities, however, smoking is often done without any attempt to clean the hands. If the "coffee break" is taken in the field, clean water is usually not available for washing. If food is stored on the tractor or in the area of the treated field, it may be contaminated with pesticide.

The aerial application of pesticides is usually performed by a contracted applicator with the timing of the applications and pesticide selection decided by the farmer. The hazards to the aerial applicator are very similar to those experienced by the ground applicator with the additional hazards associated with aircraft used at low altitudes, (e.g. power and telephone lines and other obstructions).

The potential exposure situations to farm personnel are generally the same as with ground application of pesticides with the following exceptions:

Transport of the pesticide may be by the farmer or the pilot and the pilot's assistants.

The farmer is usually not involved in the mixing/loading, rather the pilot or the assisting personnel do this operation.

Drift may be a more significant problem from aerial applications.

The pesticide is usually in a relatively concentrated mixture in the aircraft's spray tanks since ULV equipment may be used.

Mechanical failure of the aircraft may result in the emergency dumping of fairly concentrated pesticide into non-target areas.

Flagmen, although now rarely used, may be directly exposed to the spray mixture.

Statistics on the exposure of farm workers to pesticides during mixing and application are not well documented in Ontario (or in Canada for that matter) and only a small number of scientific studies have been conducted under Canadian conditions. Most of these studies have not measured contact per se but have concentrated on the detection and measurement of the pesticides in body fluids, an indirect measure of contact as well as absorption.

Franklin et al (1981) studied exposure of orchard workers to azinphos-methyl under actual use conditions in the Okanagan Valley during the use of ultra-low volume airblast spraying equipment. In all cases, metabolites of the insecticide were found in urine and a good correlation between total amount sprayed and the amounts of metabolite excreted in the urine over the 48 h post-spray period was observed. Measurement of skin contact by the use of absorbant patches showed that the major sites of contact were the normally unprotected skin of the hand, face and neck region. Air concentrations of the insecticide would have resulted in a mean uptake of 0.024 mg/h had the workers not worn respirators. Dermal contact resulted in the presence of 100 to 400 µg of azinphos-methyl metabolites in urine. In all cases exposure did not result in symptoms of poisoning or in lowering of serum or plasma cholinesterase activity. The type of protective clothing worn did not seem to have a significant effect on the degree of exposure in this type of application. A similar study of herbicide aerial applicators in Saskatchewan (Franklin et al, 1982) using urinary excretion as an indicator showed that highest exposure occurred in association with mixing of the herbicide. The pilot of the spray-plane showed the next highest exposure while that in the water carriers and the flagmen was lowest. Amounts of 2, 4-D metabolites excreted were equivalent to 39, 9.7, 4.25 and ca. 4.0 µg/kg (body weight) respectively.

In studies on herbicide applicators working on transmission line rights-of-way in Ontario, Libich et al (1984) also showed by using urine levels of herbicide metabolites that skin was a major route of absorption of the herbicides. Use of a hand gun resulted in less total exposure than a mist blower and also reduced the amount of herbicide entering the body through the inhalation route. Frank et al (1984) studied exposure to 2,4-D by measuring urinary metabolites in forest workers involved in aerial spraying. They found that exposure could be reduced by wearing a full set of protective clothing. 2,4-D and its metabolites were also found in urine during the pre-spray period and swabs of equipment and living quarters showed contamination of areas such as vehicles, refrigerator door handles, desks and underlines the importance of adequate cleanup after spraying or handling equipment.

Maddy (1981) reported a total of 116 occupational injuries in persons involved in mixing and loading pesticides in California. Slightly more than half the cases involved aerial applications of pesticides and, of the total, 42% caused systemic illness and 27% each caused eye and skin injuries. Mevinphos and methomyl accounted for 40% of the systemic injury, sulphur was the cause of 25% of the eye injuries and Omite caused half of the skin injuries. In some cases, poisoning was due to accidental exposure to the pesticide during leakage or rupture of equipment but in many cases no specific contamination incident took place.

In a study of Swedish farmers and professional spray applicators using phenoxy herbicides such as 2,4-D, Kolmodin-Hedman et al (1983) showed contamination by measuring concentrations in air and in urine. In all cases they were able to show exposure but it was seen to be more severe in the case of sprayers who took few precautions than in those who were careful. High exposure also resulted from mixing of powdered formulations of the pesticides and the major route of absorption appeared to be the skin, with inhalation and swallowing of the spray droplets as secondary routes of absorption. Stephen and Davis (1981) observed similar high contact levels for captan powder used to treat seed potatoes during cutting in North America. Again, respiratory exposure, as measured with a respirator, was considered high, although no information on total amount in the body was given.

Studies of paraquat and diquat applicators in Florida (Wojeck et al, 1983) again showed that dermal contact with the pesticides was the major source of exposure. Air contamination represented less than 1% of total exposure as measured by respirator cartridge and pads attached to the outside of the clothing. Paraquat was only detected in the urine of one worker on one day suggesting that penetration through clothing and skin was minimal.

Exposure After Application

Contrary to label directions, farmers and farm labourers may re-enter treated areas before minimum re-entry periods have expired. Exposure risk is highest in fruit and vegetable production where hand labour is used to a major extent in weeding and harvest operations. The greatest risk to farm workers is caused by those pesticides with high toxicity and long residual lives in the field, especially those that are applied as wettable powders.

This problem has been recognized for some time and has been the subject of recent extensive reviews (Gunther et al, 1977: Popendorf and Leffingwell, 1982). Toxicological problems concerning re-entry have almost always been associated with organophosphorus pesticides (Kahn, 1980). Although traditionally associated with pesticides applied to foliage in hot and dry areas such as California (Gunther et al, 1977), it may also be found in areas with similar climate to Ontario (Bogden et al, 1975) and soil residues of the pesticides may also be important as a source of toxicant (Spencer et al, 1975 and 1977).

Popendorf and Spear (1974) showed that pesticide contaminated dust dislodged from leaves in California grape and peach orchards was a major source of contamination with pesticides, either through contamination of skin or inhalation and subsequent ingestion of the dust particles.

Re-entry poisoning incidents in Canada and Ontario are not well documented and no reports of poisoning could be found. McEwen et al (1980) have studied the dissipation of pesticides from sprayed crops under Ontario conditions and showed significant differences between crops. Parathion dissipated rapidly from onion and carrot leaves with less than 25% remaining 8 hours after application while the same pesticide took about two days to dissipate to 25% of initial concentration in apple leaves. The amount of residue which could be dislodged followed similar trends. The authors point out that the persistence of pesticide residues on foliage is very dependent on climate and other factors and suggest that more information should be sought under Canadian conditions.

Bystander Exposure

It is impossible to apply a pesticide from ground or aerial sprayers without some drift. Drift from aerial applications may be more severe than that resulting from ground applications. As the farmhouse is often immediately adjacent to the treated areas, the people in its environs may be exposed to this drift. Where treated areas are adjacent to urban environments, the drift may result in pesticide exposure of people in the urban setting. No data on this type of exposure in Ontario is available.

Factors which reduce drift include: application at wind speeds no greater than 11 km/h; use of low pressures which increases droplet size and minimizes the time the droplets stay in the air; application during lower air temperatures; the use of low volatility formulations; and minimizing the distance between the spray nozzles and the target. These procedures reduce both applicator and bystander exposure.

Disposal of Containers

The final operation which would expose farm personnel to pesticides is the disposal of empty pesticide containers. These containers may be disposed of on the farm by burying or burning, or in the local sanitary landfill site. In the case of liquid pesticides, farmers may not rinse the containers thoroughly during the mixing, resulting in a significant pesticide residue remaining in used containers. Often, in the case of dry materials, a residue of dust is left in the carton or bag. During the course of disposal, this pesticide may be released and cause human exposure. This is especially true if cartons or bags are incinerated and farm workers exposed to the smoke and combustion byproducts. In addition, the recommended practice for the disposal of metal containers suggests puncturing the container. This may result in direct exposure of the farmer to any residual pesticide in the container. Farmers should thoroughly rinse all containers prior to disposal and wear personal protection equipment during disposal. Use of special rinse equipment is recommended.

Failure to dispose of pesticide containers properly has resulted in their use in dangerous situations. For example, empty pesticide containers have been used to store foodstuffs and pesticide drums have been used as floats on rafts and docks. The disposal of pesticide containers by municipal garbage removal has resulted in the exposure of sanitation personnel to pesticides either when loading the disposal trucks or when the containers are buried.

Discussion

Many of the safety procedures mentioned herein are already the subject of pesticide regulations which are difficult, if not impossible, to enforce at the farm level. Those farmers who have had personal experiences involving pesticide poisonings are much more likely to adhere to proper safety practices.

The evidence in the literature indicates that greatest exposure of farm personnel to pesticides occurs during the mixing/loading operation. Thus methods to reduce exposure via this pathway would be a priority of improved safety practices. It is noted that inadequate attention is given to:

Compliance with existing Ontario regulations with regard to the transportation, storage, mixing, application and disposal of pesticides.

The availability, knowledge and awareness of all practical measures to avoid contact with pesticides.

The use of currently available and recommended personal protection equipment.

Increasing awareness of closed-loading systems, particularly for use with formulations of pesticides which form dusts.

The use and availability of adequate methods for clean-up of pesticide spills at the mixing/loading site and the use and availability of facilities for maintenance of proper cleanliness of person and clothing.

The availability of soluble granule rather than wettable powder formulations of pesticides.